Eighth Annual Load Building and Merchandising Number

Electrical West

With which is consolidated the Journal of Electricity

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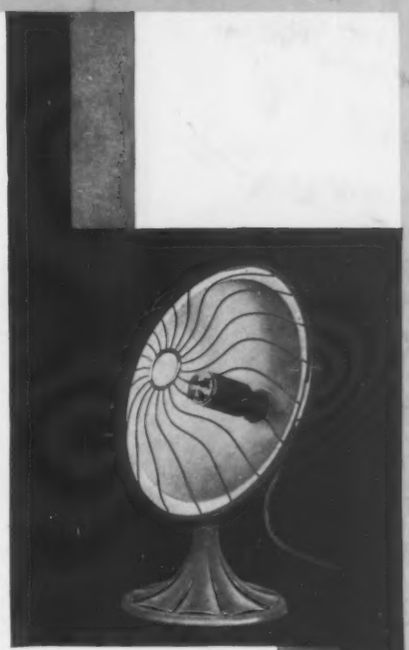
EACH A LEADER in its field



HERE are two leaders—each the unquestioned champion in its field. The Majestic Grideliere and the new Majestic Reflector Heaters. Dealers in electric appliances find them in demand by consumers because of their unquestioned merit and long-proven superiority. Power Companies that handle electric appliances find a ready sale for them. And they help increase the load delivered to consumers of electricity.

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Majestic Electric Appliance Co., Inc.

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AND A FULL LINE OF HEAVY DUTY HEATERS, WATER HEATERS, ETC.

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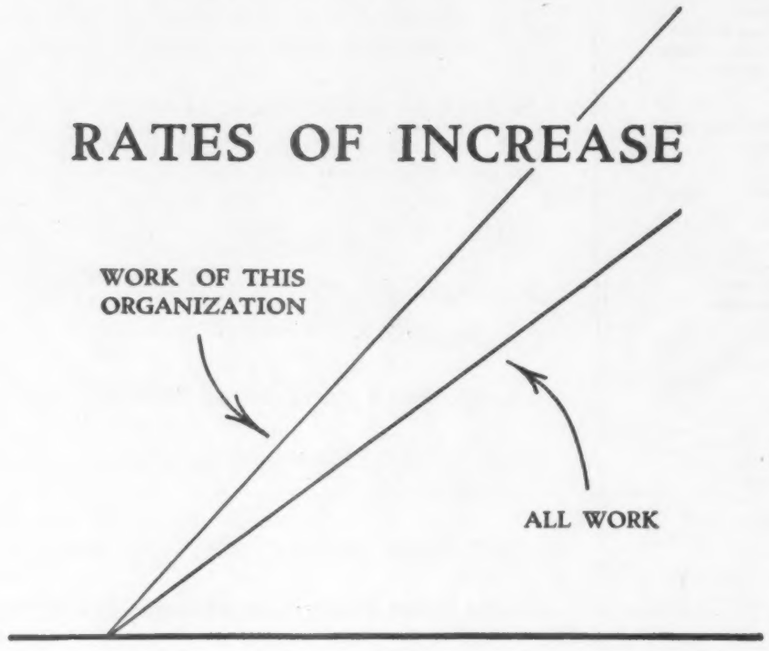
POWER CONSTRUCTION

The generating capacity of the country's power stations has doubled in the last seven years. The capacity of stations designed and built by this organization has doubled in less than five years.



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Volume 63 | San Francisco, October 1, 1929 | Number 4

Who Sells Appliances?

A Detailed Survey of the Channels of Electrical Merchandise Distribution in Three Pacific Coast Cities

GUESSING has very little place in today's machine run business. The business man of the past, when he thought of the future at all, went by instinct and by gosh. If everything turned out right he was a business genius. If it didn't—another gamble.

Engineering methods applied to business, as they are today, demand something more concrete than this. Facts, as nearly as they can be ascertained, are the building stones of the new business structure.

For some time the electrical industry has been wondering what has been happening in the electrical appliance game. True, there have been trends indicated from jobbers' purchases, manufacturers' sales, and occasional central station estimates of appliance load on their lines. To correlate these into anything resembling a clear outline of present-day conditions has been impractical. Besides, the reliability of any such loose method of diagnosis would always be open to doubt. The only certain means of determining the facts is the careful, conscientious survey.

ELECTRICAL WEST editors make store-to-store survey in three cities of 100,000 population class. Results show average appliance sales of $36.66 per domestic meter. Refrigerator is most popular appliance. Specialty stores lead in sales.

Obviously a complete survey of every city on the Pacific Coast would be prohibitive in cost. Could not a cross section survey be made of four or five cities of approximately the same size, number of meters, and population? Suppose cities in which a different relationship between central station and dealer with respect to merchandising plan were taken in each case. Would not these typical cases give a vernier reading of what might be expected in cities proportionately larger or smaller in which similar conditions prevail?

After careful consideration of the entire subject the editors of ELECTRICAL WEST decided that such a survey would prove of value. To date three such cities have been completely covered. The study is to be continued in more cities of the same size in the next few months with results to be announced later. It is not too early, however, to present here the fruits of this research in the first three cities.

One of the editors of ELECTRICAL WEST made the survey in the three cities, personally calling on every store in each of these cities in which were sold any kind of electrical appliances. Exclusive radio stores were not included. In each of these establishments the proprietor or a responsible person was interviewed and questioned specifically as to the appliances listed in the accompanying tables. In only three or four instances was the information actually refused. In such cases careful estimates were made by the editor based on personal observation of the store, appliances displayed, type of dealer, and figures given by other dealers conducting similar stores under similar circumstances.

Every precaution was taken to make the figures conservative, even to discounting figures which later investigation proved to be too optimistic. The greatest obstacle found was the lack of complete records or information on the part of most dealers, a commentary on bookkeeping methods employed by most small businesses. In such cases each item was broken down into monthly sales and the figures arrived at from careful estimation.

That the method proved as accurate as can possibly be hoped for is attested by the remarkable closeness with which the figures for the three cities approach each other in almost every instance. Where a variation does appear re-check of notes has shown a definite cause for the discrepancy—usually some local situation which has

affected the result in a particular case. Before drawing any conclusions from the results obtained it will be well to take each of the cities in detail and examine the figures which the store-to-store survey in it have produced.

City A

This city, according to government census estimates, had a population of about 109,000 people last year. The power company serves 26,000 domestic meters and a high degree of range saturation exists. This city was chosen because it is served by a private company which has long been an active merchandiser in practically all electrical appliances.

It was desired to know whether this long participation in merchandising campaigns had stimulated the general market, how it had affected other dealers' sales, and how these merchants felt about it.

Aside from this particular case-information it was desired to know the percentage of appliance sales which were placed through various types and kinds of merchant outlets, and why.

City A depends upon agriculture, lumbering and mining for its major industrial payroll and is populated by people of average income. Business conditions during 1928, the period which this survey covers, were fair, that is, neither very good nor yet depressed. In this city, the survey reveals, there were sold electrical appliances last year to a total of $1,002,794. These appliances, as will be seen from the accompanying tables, include washers, ironers, vacuum cleaners, irons, percolators, waffle irons, toasters, headlight heaters, ranges, water heaters, and refrigerators.

The distribution of these appliances was made through 51 outlets whose variety is of interest both because of the number of different types of stores represented and because of the fact that in each of the cities surveyed the list was similar. These outlets, in the order of their volume, were found to be as follows: Specialty stores, handling one or two lines only, such as washing machines or refrigerators, did 37.4 per cent of the appliance business, or $379,240—of this 77.2 per cent, or $293,100, was in refrigerators, the power company, which did 19.8 per cent of the total, or $199,886, the biggest item of which was ranges, accounting for 52.3 per cent of sales, or $104,100; department stores ranging all the way from an enlarged farmers' general store to the more exclusive type of big city store, which did 19.5 per cent of the total, or $198,210, practically as great a volume as the power company but chiefly in washing machines (47.8 per cent) and vacuum cleaners (27.2 per cent), and only doing 5.3 per cent of its business in ranges; household furnishings stores, which did 15.7 per cent of the city's total, or $157,725—and here is a remarkable circumstance: 38.9 per cent of this was in ranges and 20.9 in washers; contractor-dealers who did 4.4 per cent of the total, or $44,198 fairly evenly distributed over all appliances; hardware stores, which did 2.6 per cent of the total, or $26,785, the biggest item of which was the refrigerator, accounting for 44.8 per cent of sales. A miscellaneous list of drug stores, stove stores, jewelry stores and a sporting goods store, did 0.6 per cent of the city's total, or $6,750, the biggest item of which in actual numbers was irons.

Eliminating the electric refrigerator sales, which because of the unusual popularity of these appliances, overbalances the other appliance figures, the distribution of appliances in City A was headed by the department stores, doing 29.2 per cent, the power company doing 28.9 per cent; the household furnishings stores, with 18.7 per cent; and the specialty stores, with 13.2 per cent. Contractor-dealers came next with 6.7 per cent, hardware stores with 2.3 per cent, and miscellaneous stores with but 1 per cent.

Taking the individual appliances, the best job on washers is being done by the department stores, with 38.8 per cent, followed by the specialty shops, with 30.2 per cent. In City A both the power company (13.2) and the household furnishings stores (13.8) were very close.

On ironers, however, the power company is making the most active effort, doing 32.5 per cent of the total. The specialty shops come next with 25.7 per cent, department and household furnishings stores doing 19.7 and 17.7 per cent, respectively.

Department stores head vacuum cleaner sales in City A. They do 58.2 per cent of this business. The power company does 23.5 per cent and other types of stores do very little.

It is in the smaller appliances that the contractor-dealer in City A makes most of the sales. While the department stores sell 28.3 per cent of the irons and the power company 21.6 and the hardware dealers 25.2 per cent, the contractor-dealer does 23.2 per cent of this business. In waffle irons the contractor-dealers do 29.8 per cent of the business, the central station 27.8, the department stores 21.4 per cent. In percolators the department stores sell 30.7 per cent of all sold, the contractor-dealer 23.2, the power company 18.8 and miscellaneous stores 11.7 per cent.

Toaesters, too, are sold by the contractor-dealers in excess of sales through other outlets. The dealers in City A do 34.3 per cent of the toaster business. An interesting sidelight on this situation is that in the majority of cases the higher priced, better quality appliances are sold by the contractor-dealers, which fact, while it does not result in as many numerically does increase the gross volume for this class of business.

As for headlight or glow type of portable heaters, the central station does the bulk of business, or 35.5 per cent, electrical dealers coming next with 18.2 per cent.

Who Sells Ranges and Why?

Ranges in each of the cities surveyed told a story of themselves. It is in respect to these appliances that the effect of the central station's policy is most graphically portrayed. In City A the power company has done an excellent range job. A high degree of saturation exists. It still does the bulk of the range business. In fact other dealers in City A, with a few exceptions, have discontinued handling ranges of any kind, insisting that they cannot compete with the terms offered by the power company. Their efforts are concentrated on the sale of hotplates, of which a large number are sold in this city yearly.

The one contractor-dealer who did sell 18 ranges is an excellent merchandiser. Another sold six ranges. But a rather unexpected development of the range acceptance in this city is the entrance of one department store in the range business last year. It is planning more active development of this business this year.

Sales of Principal Electrical Appliances Showing Quantity, Value and Proportion Sold by Various Outlets City "A"

Kind of Dealer	Washers	Ironers	Vacuum Cleaners	Irons	Perc-olators	Waffle Irons	Toasters	Headlight Heaters	Ranges	Water Heaters	Refrig-erators	Total Sales Each Class of Store	Per Cent of Total for City
Hardware Store "A"	....	....	....	200	75	60	100	....	....	....	....		
Hardware Store "B"	....	....	....	175	90	75	90	30	....	....	....		
Hardware Store "C"	25	....	12	250	50	40	50	25	15	10	40		
(15 small stores)													
TOTAL	25	....	12	625	215	175	240	55	15	10	40		
VALUE	$3,250	....	$720	$3,125	$1,720	$1,750	$1,440	$330	$2,250	$200	$12,000	$26,785	2.6
Per cent stores' appliance sales	12.1	....	2.7	11.7	6.4	6.5	5.4	1.2	8.4	0.8	44.8		
Department Store "D"	500	50	280	750	300	190	500	125	....	....	....		
Department Store "E"	200	20	100	125	25	10	25	15	....	....	....		
Department Store "F"	....	....	500	600	400	200	250	30	75	25	25		
Department Store "G"	....	....	10	40	100	250	1,100	....	....	....	....		
(3 small stores)													
TOTAL	700	70	890	1,515	825	650	1,875	170	75	25	25		
VALUE	$95,500	$6,600	$53,400	$6,060	$6,500	$4,750	$5,755	$1,020	$10,500	$625	$7,500	$198,210	19.5
Per cent stores' appliance sales	47.8	3.4	27.2	3.1	3.3	2.4	2.9	0.5	5.3	0.3	3.8		
Specialty Shop "H"	240	48	50	....	....	....	....	....	....	....	....		
Specialty Shop "I"	210	....	....	....	....	....	....	....	....	....	....		
Specialty Shop "J"	....	....	....	....	....	....	....	....	....	....	300		
Specialty Shop "K"	....	....	....	....	....	....	....	....	....	....	267		
Specialty Shop "L"	....	....	....	....	....	....	....	....	....	....	510		
TOTAL	550	48	50	....	....	....	....	....	....	....	1,077		
VALUE	$74,250	$8,640	$3,250	....	....	....	....	....	....	....	$293,100	$379,240	37.4
Per cent stores' appliance sales	19.6	2.3	0.9	....	....	....	....	....	....	....	77.2		
Contractor-Dealer "M"	30	10	60	300	250	275	400	75	18	18	3		
Contractor-Dealer "N"	....	....	25	500	200	200	500	40	6	25	....		
Contractor-Dealer "O"	....	....	6	50	30	25	12	12	....	5	....		
Contractor-Dealer "P"	10	....	1	30	6	10	15	20	....	6	....		
Contractor-Dealer "Q"	10	....	14	125	60	40	75	30	....	15	....		
(5 small stores)													
TOTAL	50	10	106	1,005	546	550	1,002	177	24	69	3		
VALUE	$6,750	$1,400	$6,360	$5,025	$4,914	$6,600	$6,012	$1,062	$3,600	$1,725	$750	$44,198	4.4
Per cent stores' appliance sales	15.3	3.1	14.4	11.4	11.2	15.0	13.6	2.4	8.1	3.9	1.7		
Household Furnishing Goods Store "R"	250	50	100	350	200	175	225	125	400	350	150		
VALUE	$33,750	$6,000	$6,500	$1,750	$1,600	$1,750	$1,125	$750	$60,000	$7,000	$37,500	$157,725	15.7
Per cent store's appliance sales	20.9	4.0	4.1	1.1	1.0	1.1	0.7	0.5	38.9	4.4	23.3		
Miscellaneous "S"	....	....	....	400	125	100	200	25	....	12	....		
(12 stores)*													
VALUE	....	....	....	$1,000	$2,500	$1,200	$1,200	$600	....	$250	....	$6.750	0.6
Per cent stores' appliance sales	....	....	....	14.8	37.1	17.8	17.8	8.8	....	3.7	....		
Central Station "T"	261	182	359	777	337	616	335	345	694	590	....		
VALUE	$32,600	$10,900	$21,550	$4,662	$4,044	$6,150	$2,010	$2,070	$104,100	$11,800	....	$199,886	19.8
Per cent company's appliance sales	16.2	5.6	10.7	2.3	2.0	3.1	1.0	1.0	52.3	5.8	....		
GRAND TOTAL	1,836	360	1,517	4,672	2,248	2,266	3,877	897	1,208	1,056	1,295		
TOTAL VALUE	$246,100	$33,540	$91,780	$21,622	$21,278	$22,200	$17,542	$5,832	$180,450	$21,600	$350,850	$1,002,794	100.0
Per cent total appliance sales	24.4	3.3	9.1	2.2	2.1	2.2	1.7	0.6	18.0	2.2	35.0	100.0	....

*—5 Drug, 2 Stove, 4 Jewelry, 1 Sport Goods.

The more unusual thing, however, is that a large and aggressive household furnishing establishment sold 400 ranges last year and this year is increasing that considerably. This range business, as well as other appliance business done by it, is done in a highly competitive sense. With the inside track of household furnishings this establishment is featuring the sale of a completely different line of ranges and is selling the electric appliances in with the complete bill of furniture. In apartment house range business it has engaged the power company salesmen in decisive competitive business. With this particular advantage which a complete order of household equipment from one house, on long terms and competitive prices, gives it, this establishment feels that between it and the power company a practical domination of the appliance field can be maintained. This is a peculiar situation, one not duplicated in either of the other two cities surveyed. This aggressive attitude and the capitalizing of its stragetic sales advantage has resulted in gaining for this company 15.7 per cent of all the appliance business in City A as compared with 19.8 per cent for the power company.

A good job is being done in City A on water heaters, most of them being of the bayonet insert type selling for around $20. While the power company sells a water heater with almost every range, the contractor-dealers sell more water heaters than ranges, bringing up the total for the city very close to one water heater per range last year.

Refrigerators, in each city, are so popular a selling item that they affect percentage figures enough to justify a table on percentage of appliance sales through various channels with refrigerators eliminated. In City A the power company displays but does not sell refrigerators. The specialty stores, however, doing 83.6 per cent of the selling of these appliances in City A, sold 1,077 units, or approximately $293,100 in refrigerators during 1928, exceeding the total range volume for the entire city, which was $180,450. The total volume in refrigerators for the year for the city was $350,850, or nearly double the range volume. Refrigerators accounted for 35 per cent of the city's entire appliance business last year and indications were that this year's business in this appliance would exceed by far last year's figures.

The figures presented in the accompanying tables reveal many more facts and trends of value and interest but space will permit of only the mention of a summary reduced to its lowest terms. City A, with an officially estimated population of 109,000 and 26,000 domestic meters, absorbed $1,002,794 worth of electrical appliances during 1928. This, in other words, amounted to

Total Percentage of Appliance Sales Through Various Classes of Dealers

Kind of Dealer	Washers	Ironers	Vacuum Cleaners	Irons	Percolators	Waffle Irons	Toasters	Headlight Heaters	Ranges	Water Heaters	Refrigerators
CITY "A"											
Hardware Stores	1.3	....	0.8	15.2	8.1	7.8	8.2	5.7	1.2	0.9	3.4
Department Stores	38.8	19.7	58.2	28.3	30.7	21.4	32.8	17.5	5.8	2.9	2.1
Specialty Shops	30.2	25.7	3.5	....	....	....	....	....	....	....	83.6
Contractor-Dealers	2.7	4.2	6.9	23.2	23.2	29.8	34.3	18.2	2.0	8.0	0.2
Household Furnishing Goods Stores	13.8	17.7	7.1	8.1	7.5	7.8	6.4	12.8	33.3	16.2	10.7
Miscellaneous	....	....	....	4.6	11.7	5.4	6.8	10.3	....	1.2	....
Central Station	13.2	32.5	23.5	21.6	18.8	27.8	11.5	35.5	57.7	54.8	....
CITY "B"											
Hardware Stores	0.5	....	0.8	15.0	29.4	15.5	18.2	13.5	1.1	1.4	....
Department Stores	8.4	....	12.5	47.2	36.2	50.7	48.5	34.7	7.5	....	6.2
Specialty Shops	59.6	43.1	71.0	....	....	....	....	....	....	....	90.6
Contractor-Dealers	20.0	46.8	7.2	12.6	11.0	10.4	12.3	21.3	1.8	32.5	0.7
Household Furnishing Goods Stores	10.0	7.7	7.5	7.9	9.6	12.4	10.7	10.0	11.3	....	....
Miscellaneous	1.5	2.4	1.0	13.3	12.8	11.0	10.3	20.5	13.6	....	2.5
Central Station	....	....	....	....	....	....	....	....	64.7	66.1	....
CITY "C"											
Hardware Stores	3.1	....	0.5	17.2	8.4	6.9	14.2	8.3	....	....	....
Department Stores	7.1	9.8	6.9	14.8	20.9	21.0	12.4	10.5	....	....	....
Specialty Shops	63.1	43.7	58.7	....	....	....	....	....	....	....	96.2
Contractor-Dealers	15.0	13.3	6.3	19.8	18.6	11.2	18.1	12.4	8.3	9.1	1.1
Household Furnishing Goods Stores	3.5	10.3	18.5	20.0	27.8	22.9	30.6	29.8	3.6	....	0.9
Miscellaneous	0.9	....	....	11.2	10.3	11.3	10.3	4.8	19.6	10.0	0.3
Central Station	7.3	22.9	9.1	17.0	14.0	26.7	14.4	34.2	68.5	80.9	1.5

$38.60 in appliances per meter, or $9.20 per capita. Sales per meter of the smaller convenience outlet appliances alone, such as irons, percolators, waffle irons, toasters and headlight heaters, amounted to $3.41, which will be seen from figures of Cities B and C to be high. It would seem to be indicated from this fact that the active merchandising program of the central station in City A had been stimulative to sales through all channels.

Further results of the survey, such as merchants' reaction to the central station program, buying channels for appliances, and other byproducts of the interviews on appliance statistics, must be deferred to another article. Lack of space and a desire to continue the survey into two or three more cities before making comparisons indicate that this will be a more satisfactory means of treating the subjects at their full value.

City B

In City B the central station is operated by the municipality. The system is a hydro system and very low domestic rates prevail. The municipal lighting board sells only ranges and water heaters, but it sells these at its cost plus a small handling charge. It has but one man in the field but three dealers act as its agents. Two range campaigns are conducted each year.

The population of City B is officially estimated by the U. S. Census as 107,200 and the municipality has 27,400 domestic meters connected. The payroll is derived from lumbering, agriculture and shipping, and as in City A business conditions have been fair. Affected by the declined building program the lumber industry has been operating at about half production.

City B was chosen to determine what effect the municipality's method of merchandising,—that is, selling only ranges, and these at cost—had on both the range market and the appliance market as well as to determine the percentage of sales through various types of outlets.

A total of $1,021,082 in electrical appliances of the types covered in this survey were sold by 50 outlets. Of this volume, which by the way is very nearly that of City A, it is interesting again to see that 47.4 per cent was in refrigerators as against 35 per cent in City A. Washers accounted for 23.5 per cent of the volume and ranges came third with 13 per cent of the volume. This order of percentages held in City A as well.

In City B only one department store handled or sold ranges, the others declaring they could not compete with the city's prices. The one department store selling ranges sold a competing line of ranges which it could sell to charge account customers on long terms. It accounted for the 9.9 per cent of the department store total volume of appliances in ranges.

One household furnishings store in City B has an active electrical department and does 5 per cent of the city's total appliance business, or $51,590. This store handles no refrigerators, but did 29.1 per cent of its business in ranges last year. Again here is an example of the house furnishings' inside track for a complete bill of household equipment including range, washer, ironer and appliances. Its biggest selling item is the washer, but in the face of city ranges at cost it still sold 100 ranges.

The miscellaneous group in City B presents a peculiar situation. It accounts for 4.4 per cent of the city's total sales, or $44,945. The surprising part of the situation is that 40.1 per cent of this amount is in ranges and 26.6 per cent in refrigerators.

This group, however, has added to the miscellaneous group of jewelry, drug, and stove stores in City A a music store, two hotel supply stores and two chain stores. Of the 4.4 per cent of the city's total appliance volume accounted for by this miscellaneous group amounting to $44,945 in merchandise, 40.1 per cent was in ranges, which, strangely enough, were sold by the music store which has a large and active electrical department. Refrigerators too were sold to the extent of 26.6 per cent of this group's volume. These were accounted for by the hotel supply houses and the music store.

In passing, it is of interest to note that the jewelry stores in City B sold a generally higher priced line of electrical appliances than in City A. In the latter city lines of special price appliances were featured by two or three jewelers as a means of attracting trade and starting charge accounts.

Who Sells What?

Looking at the situation in City B in another way, from the standpoint of individual appliances, the figures in the table on the total percentage of appliance sales sum up an interesting basis of comparison between the three cities.

Sales of Principal Electrical Appliances Showing Quantity, Value and Proportion Sold by Various Outlets City "B"

Kind of Dealer	Washers	Ironers	Vacuum Cleaners	Irons	Percolators	Waffle Irons	Toasters	Headlight Heaters	Ranges	Water Heaters	Refrigerators	Total Sales Each Class of Store	Per Cent of Total for City
Hardware Store "A"	5	....	5	600	500	150	500	85	10	15	....		
Hardware Store "B"	....	....	....	60	144	36	144	36	....	....	....		
Hardware Store "C" (2 small stores)	2	....	5	100	75	40	60	25	....	....	....		
TOTAL	7	....	10	760	719	226	704	146	10	15	....		
VALUE	$1,155	....	$500	$3,800	$4,314	$2,260	$2,816	$730	$1,500	$300	....	$17,375	1.7
Per cent stores' appliance sales	6.7	....	2.9	21.9	24.8	13.0	16.2	4.2	8.6	1.7	....		
Department Store "D"	200	....	150	....	....	....	....	....	....	....	100		
Department Store "E"	....	....	....	750	200	175	350	110	65	....	....		
Department Store "G"	....	....	....	900	320	210	400	125	....	....	....		
Department Store "H"	....	....	....	600	225	160	300	90	....	....	....		
Department Store "I"	....	....	....	150	100	200	200	50	....	....	....		
TOTAL	200	....	150	2,400	845	740	1,250	375	65	....	100		
VALUE	$20,000	....	$7,500	$12,000	$5,070	$7,400	$7,500	$1,875	$10,000	....	$30,000	$101,345	9.9
Per cent stores' appliance sales	19.7	....	7.4	11.8	5.0	7.3	7.4	1.8	9.9	....	29.5		
Specialty Shop "J"	350	....	....	....	....	....	....	....	....	....	....		
Specialty Shop "K"	300	25	225	....	....	....	....	....	....	....	....		
Specialty Shop "L"	250	....	....	....	....	....	....	....	....	....	....		
Specialty Shop "M"	40	10	480	....	....	....	....	....	....	....	3		
Specialty Shop "N"	....	....	....	....	....	....	....	....	....	....	400		
Specialty Shop "O"	....	....	....	....	....	....	....	....	....	....	410		
Specialty Shop "P"	....	....	....	....	....	....	....	....	....	....	300		
Specialty Shop "Q"	....	....	....	....	....	....	....	....	....	....	170		
TOTAL	940	35	705	....	....	....	....	....	....	....	1,283		
VALUE	$142,500	$4,200	$42,300	....	....	....	....	....	....	....	$438,000	$627,000	61.5
Per cent stores' appliance sales	22.7	0.7	6.7	....	....	....	....	....	....	....	69.9		
Contractor-Dealer "R"	240	12	6	250	96	60	144	72	....	100	4		
Contractor-Dealer "S"	35	15	30	40	10	20	12	12	....	30	....		
Contractor-Dealer "T"	18	6	12	30	3	10	24	....	4	15	2		
Contractor-Dealer "U"	5	3	12	50	25	12	36	60	4	40	....		
Contractor-Dealer "V"	....	....	2	20	10	10	15	12	6	1	....		
Contractor-Dealer "W" (12 small dealers)	31	2	10	251	80	40	85	36	2	170	2		
TOTAL	329	38	72	641	224	152	316	192	16	356	8		
VALUE	$47,800	$4,560	$4,320	$3,205	$1,544	$1,520	$1,896	$1,152	$2,400	$7,120	$3,200	$78,717	7.7
Per cent dealers' appliance sales	60.6	5.8	5.5	4.1	2.0	1.9	2.4	1.5	3.0	9.1	4.1		
Household Furnishing Goods Store "X"	160	6	75	400	225	180	275	90	100	....	....		
VALUE	$24,000	$750	$4,500	$2,000	$1,350	$1,800	$1,650	$540	$15,000	....	....	$51,590	5.0
Per cent store's appliance sales	46.5	1.5	8.7	3.9	2.6	3.5	3.2	1.0	29.1	....	....		
Miscellaneous "Y" (14 stores)*	24	2	10	1,100	300	200	400	225	120	....	40		
VALUE	$3,600	$240	$600	$4,400	$1,800	$1,600	$1,600	$1,105	$18,000	....	$12,000	$44,945	4.4
Per cent stores' appliance sales	8.0	0.5	1.3	9.8	4.0	3.6	3.6	2.5	40.1	....	26.6		
Central Station "Z" (Municipal Plant)	....	....	....	....	....	....	....	....	571	723	....		
VALUE	....	....	....	....	....	....	....	....	$85,650	$14,460	....	$100,110	9.8
Per cent utility's appliance sales	....	....	....	....	....	....	....	....	85.6	14.4	....		
GRAND TOTAL	1,660	81	1,022	5,301	2,313	1,498	2,945	1,028	882	1,094	1,431		
TOTAL VALUE	$239,055	$9,750	$59,720	$25,405	$14,078	$14,580	$15,462	$5,402	$132,550	$21,880	$483,200	$1,021,082	..
Per cent total appliance sales	23.5	0.9	5.8	2.5	1.4	1.4	1.5	0.5	13.0	2.1	47.4		

*—3 Jewelry, 4 Drug, 2 Chain, 1 Music, 2 Hotel Supply, 2 Stove.

With ranges the municipality's sales very naturally lead. The city sells 64.7 per cent of the ranges, the music store doing the next best, household furnishings next and department stores 7.5 per cent. Water heaters, however, show the central station selling 66.1 per cent, the contractor-dealers 38.5 per cent and the hardware dealers 1.4 per cent, no others selling these appliances. More water heaters were sold than ranges, it will be seen. There were 882 ranges sold and 1,094 water heaters, which shows a growing acceptance of water heating among former purchasers of ranges. The total volume of water heaters in the two cities A and B also will be found to be very close.

It is in refrigerator sales that City B makes up in volume for some of its lower volumes in other appliances. Ninety per cent of these were sold through specialty stores, 6.2 per cent through department stores, and lesser percentages by other dealers.

To reduce City B's figures to their least common divisors is to express them in terms of sales per meter and per capita. City B has an officially estimated population of 107,200; its domestic meters connected number 27,400. The sales of all appliances totaled $1,021,082.

The sales per meter, all appliances considered, were $37.30. This was slightly less than City A's $38.60. Sales per capita, however, were more. They were $9.54 as against City A's $9.20. Eliminating the major appliances and considering only the convenience outlet appliances, such as ironers, percolators, waffle irons, toasters and headlight heaters, sales per meter were $2.73. Compared with the $3.41 sales per meter in City A this would indicate a slightly better market development in the city in which active merchandising was engaged in by the power company. That the contractor-dealers and other outlets lose a corresponding amount of business which merely goes through the power company or other channel is also obvious. In other words, the only advantage which can be claimed for the active merchandising program is $1.30 per meter for all appliances and only 68 cents per meter in sales of the smaller appliances.

As previously stated, the question of whether the increased sale of appliances is justified in the face of dealer reaction will be treated in another article which will take up this phase of the survey.

City C

In City C another typical central station situation is found. The central station, a private company, has a

Sales of Principal Electrical Appliances Showing Quantity, Value and Proportion Sold by Various Outlets City "C"

Kind of Dealer	Washers	Ironers	Vacuum Cleaners	Irons	Percolators	Waffle Irons	Toasters	Headlight Heaters	Ranges	Water Heaters	Refrigerators	Total Sales Each Class of Store	Per Cent of Total for City
Hardware Store "A"	50	....	12	144	3	6	140	48	....	....	....		
Hardware Store "B"	....	....	....	300	75	110	125	100	....	....	....		
Hardware Store "C"	....	....	....	420	72	36	120	85	....	....	....		
(8 stores)													
TOTAL	50	....	12	864	150	152	385	233	....	....	....		
VALUE	$8,250	....	$720	$4,320	$900	$1,500	$2,310	$1,398	....	....	....	$19,398	1.4
Per cent stores' appliance sales	42.7	....	3.7	22.2	4.6	7.7	11.9	7.2	....	....	....		
Department Store "D"	200	20	100	225	125	110	125	115	....	....	....		
Department Store "E"	....	....	110	700	250	400	550	325	....	....	....		
TOTAL	200	20	210	925	375	510	675	440	....	....	....		
VALUE	$19,000	$1,600	$10,500	$3,700	$2,250	$4,590	$2,025	$1,760	....	....	....	$45,425	3.4
Per cent stores' appliance sales	41.7	3.5	23.2	8.1	5.0	10.1	4.5	3.9	....	....	....		
Specialty Store "F"	300	80	....	....	....	....	....	....	....	....	....		
Specialty Store "G"	410	30	165	....	....	....	....	....	....	....	....		
Specialty Store "H"	308	9	....	....	....	....	....	....	....	....	....		
Specialty Store "I"	....	....	1,200	....	....	....	....	....	....	....	....		
Specialty Store "J"	100	....	....	....	....	....	....	....	....	....	....		
Specialty Store "K"	....	....	....	....	....	....	....	....	....	....	500		
Specialty Store "L"	....	....	....	....	....	....	....	....	....	....	2,000		
Specialty Store "M"	....	....	....	....	....	....	....	....	....	....	303		
(4 stores)													
TOTAL	1,118	119	1,365	....	....	....	....	....	....	....	2,803		
VALUE	$167,700	$7,140	$88,750	....	....	....	....	....	....	....	$740,900	$1,004,490	73.9
Per cent stores' appliance sales	16.7	0.7	8.8	....	....	....	....	....	....	....	73.8		
Contractor-Dealer "N"	200	6	50	375	50	50	200	150	....	....	....		
Contractor-Dealer "O"	....	....	30	120	24	48	48	36	....	....	25		
Contractor-Dealer "P"	60	12	60	200	80	75	100	90	12	6	....		
(15 dealers)													
TOTAL	265	18	160	995	250	221	492	348	27	11	28		
VALUE	$39,850	$2,160	$9,600	$4,975	$2,000	$2,452	$2,952	$2,088	$4,050	$1,100	$8,400	$79,627	5.9
Per cent dealers' appliance sales	50.1	2.7	12.1	6.1	2.5	3.1	3.7	2.6	5.1	1.4	10.6		
Household Furnishing Goods Store "Q"	75	12	560	1,000	500	500	1,000	1,000	10	....	25		
(2 stores)													
VALUE	$9,465	$1,680	$28,000	$5,000	$3,000	$5,000	$5,000	$5,000	$1,750	....	$7,500	$71,395	5.3
Per cent stores' appliance sales	13.2	2.4	39.2	7.0	4.2	7.0	7.0	7.0	2.5	....	10.5		
Miscellaneous "R"	25	....	....	900	225	310	420	200	55	12	7		
(15 stores*)													
VALUE	$2,500	....	....	$2,700	$1,105	$2,480	$1,680	$800	$9,625	$1,200	$2,100	$24,190	1.8
Per cent stores' appliance sales	10.3	....	....	11.2	4.6	10.2	6.9	3.3	39.9	4.9	8.7		
Central Station "S"†	126	41	269	753	341	425	316	370	233	112	28		
VALUE	$19,500	$3,715	$13,750	$4,263	$1,510	$5,835	$2,360	$5,725	$33,645	$9,756	$10,080	$110,139	8.3
Per cent company's appliance sales	17.6	3.4	12.5	3.9	1.4	5.3	2.1	5.2	30.6	8.9	9.1		
GRAND TOTAL	1,859	210	2,576	5,437	1,841	2,118	3,288	2,591	325	135	2,891		
TOTAL VALUE	$266,265	$16,295	$151,320	$24,950	$10,765	$21,857	$16,327	$16,771	$49,070	$12,056	$768,980	$1,354,664	....
Per cent total appliance sales	19.8	1.2	11.3	1.8	0.8	1.6	1.2	1.2	3.4	0.9	56.8		

*—9 Drug, 2 Chain, 1 Building Material, 3 Miscellaneous
†—Six months' sales only.

substantial and profitable gas business. It makes no secret of the fact that it is not desirous of changing this business for electric range load which will require investment in facilities to serve it in territory in which gas facilities are already installed. Not having competition from another power company, therefore, it has not actively solicited electric range business in its gas territory. Until recently it was held by dealers in the city that the central station actually discouraged range business which they might develop. Now it sells ranges to those who desire them, even conducts one or two range campaigns a year, but these are chiefly in its electric rural territory.

This company last year established its first retail store in its main office. Previous to this it had merchandised from its branch offices only, with the exception of kitchen lighting units and other appliance specials carried from door to door.

The reason for selecting City C was to determine the effect of an active gas business by the central station on the appliance market, the effects of starting a merchandising department on a big scale after many years of no merchandising activity whatsoever, and finally to determine the appliance absorption by the type of population represented in this city.

City C is officially estimated to have 115,300 population. It covers an extensive area and for that reason there are several well defined business areas outside of the downtown business section, each of which is highly developed. The power company serves 39,376 residence meters, a high proportion of the population, probably due to the fact that this city is largely populated by retired people of small families. The payroll of the city is derived from cotton industries, shipping, agriculture, and army and navy posts and recreation activities. Business conditions have been slow generally.

The central station began merchandising actively during the middle of summer last year. It has 25 salesmen, all but eight of whom are in the city field. Monthly campaigns of appliance specials, with premium offerings and terms payable with light bills, have been featured. List prices otherwise are maintained.

In this city the total appliance sales amounted to $1,345,664. Of this total the specialty stores did $1,004,490, or 73.9 per cent. It will be interesting to note that this city's specialty stores did more business than the total for City A. Of this $1,004,490 done by the specialty organizations, 73.8 per cent, or $740,900, was in refrigerators, 16.7 per cent, or $167,700, in washers, and $88,750, or 8.8 per cent, in vacuum cleaners.

During the six months of its operation of a merchandising department the central station did 8.3 per cent

of the total for City C, or $110,139. This volume was pretty evenly spread out over the various appliances, with ranges accounting for 30.6 per cent of the volume, washers 17.6 per cent, vacuum cleaners 12.5 per cent, refrigerators 9.1 per cent and water heaters 8.9 per cent. Waffle irons and headlight heaters were its best small appliances. It must be borne in mind that it did not begin to sell refrigerators until late in the year. This year's figure on refrigerators is much larger.

Contractor-dealers as a group came next in percentage of total sales. They did a business of $79,627, or 5.9 per cent of the total. Of this 50.1 per cent was in washers, 12.1 per cent in vacuum cleaners and 10.6 per cent in refrigerators. Contractor-dealers sold 5.1 per cent of their total volume in ranges and 1.4 per cent in water heaters.

Household furnishings stores came next in importance, doing 5.3 per cent of the city's total, or $71,395. Vacuum cleaners were the biggest selling item, 39.4 per cent of the volume going to this appliance. Washers accounted for 13.2 per cent of the total. Refrigerators came next, 10.6 per cent of the trade of stores in this class being done in that appliance. An even distribution of all smaller appliances is being accomplished in this city by a large housewares store included in this classification. Ranges have just been taken on as a feature item by a large furniture store, also included in this class, and it is expected that this appliance next year will show marked increase. Recent rate reductions and establishment of combination rates for cooking and lighting have opened up the field for more range sales in this city.

Only two department stores sell appliances in this city, one other having closed out its electric department early last year. Both of those remaining sell a considerable quantity of appliances. Together they account for 3.4 per cent of the city's total, or about $45,425. The biggest volume of this is in washers, in which 41.7 per cent was done. Vacuum cleaners came next with 23.2 per cent of the volume and electric irons next with 8.1 per cent.

Hardware dealers did about 1.4 per cent of the city's total volume, or $19,398. One dealer sold washers, running up the percentage on this appliance to 42.7 per cent of the total. Irons are the leading item of sale. In this appliance 22.2 per cent of hardware dealers' volume was done.

Miscellaneous stores in this city included drug stores, chain notion stores, a building material exhibit dealer selling home equipment as part of the original building equipment, and three stores best described as miscellaneous, or perhaps a species of department store. Grocery chain stores in this city, too, offered specials on irons and toasters at different times last year but figures on these were not available.

These miscellaneous stores combined did 1.8 per cent of the city's total appliance volume, or $24,190. Eleven per cent of this volume was in irons, 10.3 per cent in washers, 10.2 per cent was in waffle irons and 6.9 per cent in toasters. No ironers or vacuum cleaners were sold by this group directly. The building material exhibit dealer accounted for 39.9 per cent of this group's sales in ranges, its 8.7 per cent in refrigerators and its 4.9 per cent in water heaters.

It is well to comment here on the fact that water heaters sold in City C are of the storage or high wattage type whose cost is far in excess of those sold in City A or B.

Individual Appliance Figures

A glance at the bottom of the table for City C will show the proportional distribution of the different appliances. Of the total appliance business in City C 56.8 per cent was in refrigerators. Compare this with the 35 per cent of City A and the 47.4 per cent of City B. It is to be expected, too, that washers should come next in City C, with 19.8 of the total. Since ranges have formed no major part of the power company's program this appliance does not even come in fourth place, which is taken by vacuum cleaners with 11.3 per cent of total business. Ranges come in for 3.4 per cent of the city's gross business, water heaters only 0.9 per cent.

Percentage of Appliance Sales Through Various Channels with Refrigerators Eliminated

Kind of Dealer	Per Cent of Total Sales for City "A"	Per Cent of Total Sales for City "B"	Per Cent of Total Sales for City "C"
Hardware Stores	2.3	3.2	3.3
Department Stores	29.2	13.3	7.7
Specialty Shops	13.2	35.2	45.0
Contractor-Dealers	6.7	14.0	12.3
Household Furnishing Goods Stores	18.7	9.6	10.9
Miscellaneous	1.0	6.1	3.8
Central Station	28.9	18.6	17.0
TOTAL	100.0	100.0	100.0

Taking numbers of individual appliances sold and comparing them in the three cities it will be seen that the number of washers is very close, whether merchandised by the central station or not. Ironers show best in City A, where 360 were sold, and City C, where 210 were sold, in both cases promoted as this appliance seems to require, by the central station.

In vacuum cleaners City C leads, with 2,576 sold as against 1,022 in City B and 1,517 in City A. Percolators and irons seem not to have required central station activity to sell in either city but waffle irons and toasters have seemed to sell to a slightly larger extent in the two cities where central station campaigns on them have been featured.

In headlight heaters City C leads the other two, in spite of more favorable rates for lighting in City B. This is due to climatic conditions favoring these incidental heaters.

Ranges, in City C, show the lack of energetic campaigning which has characterized City A. In City C only 325 ranges were sold by all outlets last year, these figures would tend to show, as against 882 in City B and 1,208 in City A. Water heaters show the same result although in dollar volume for the 135 sold City C shows proportionately high. As already explained this is due to the class of water heater sold in this locality.

The table giving the total percentage of appliance sales through various classes of dealers becomes more interesting after City C has been given the foregoing examination. A comparison between the three cities as to percentages on individual appliances reveals a great many unexpected situations, only a few of which can be touched upon here.

As in the cases of Cities A and B the bulk of washer sales went through specialty stores in City C. As in City B the contractor-dealers came next. In City A the

department stores figured more strongly in this appliance than in either of the two other cities. In ironers, however, the central station figured strongly in the percentage table, in Cities A and C, despite the bulk of sales being made by specialty stores.

Vacuum cleaners, in City C, were sold best through specialty stores and house furnishings stores, the former doing 58.7 per cent of the total, the latter doing 18.5 per cent.

The distribution of irons was pretty evenly divided among all classes of outlets. Household furnishings stores in City C sold the most percolators, 27.8 per cent, and the contractor-dealers 18.6 per cent. The department stores sold 20.9 per cent.

The waffle iron campaigns of the power company placed it as the chief merchandiser of this appliance, with 26.7 per cent of the total. Household furnishings stores sold 22.9 per cent and department stores 21 per cent of the total.

Toasters, too, were sold to greater volume by the household furnishings stores (30.6 per cent) and contractor-dealer (18.1 per cent), with all other dealers doing approximately the same volume.

Headlight heaters sold best through the central station, which did 34.2 per cent of the total, the household furnishings stores, which sold 29.8 per cent, and contractor-dealers, which sold 12.4 per cent.

On ranges and water heaters the central station did 68.5 per cent and 80.9 per cent of the total, respectively.

Eliminating the refrigerators, as was done in the case of the other two cities, the percentage of all appliances sold through various channels in City C placed specialty shops first in point of percentage. These outlets sold 45.0 per cent of all appliances for City C outside of refrigerators. This is a larger percentage of total sales than that done by the same class of outlets in the other two cities. Specialty stores in City A, it will be remembered, sold 13.2 per cent of the total; in City B they sold 35.2 per cent.

The central station, in City C, came next with 17 per cent of total sales. This, it must be remembered, was for six months' operation of the merchandising department.

Sales Per Meter and Per Capita

To reduce the figures to sales per meter and per capita it is necessary that meter and population figures be reviewed. In City C the officially estimated population is set at 115,300. The number of meters to domestic customers is 39,375. The total sales of all appliances for 1928 amounted to $1,354,664.

This would place the sales per meter in City C at $34.40, lower than in either City A or B. However, and though seemingly a paradox, the sales per capital are $11.77, higher than in either A or B. This is accounted for by the larger number of meters for the population, as already explained, due to the type of population.

On the convenience outlet appliances, which included irons, percolators, waffle irons, toasters and headlight heaters, the sales per meter are $2.31, lower than in either of the other two cities. In City A this was $3.41. In City B it was $2.73. This can only be accounted for by the unusually large sales of refrigerators and washers in this city. This, however, does not wholly account for the fact that the convenience outlet appliances do not seem to enjoy as great an acceptance.

Conclusions

While final conclusions on the survey will be reserved until other cities have been covered and all factors taken under consideration, certain conclusions can be reached as to appliance distribution taken from the study of these three cities.

The following table, for instance, is of particular interest:

Average Sales Per Meter for Each Appliance —All Three Cities

Washers	$ 8.11
Ironers	0.64
Vacuum cleaners	3.27
Ironers	0.78
Percolators	0.50
Waffle irons	0.63
Toasters	0.53
Headlight heaters	0.30
Ranges	4.02
Water heaters	0.60
Refrigerators	17.28
Total	$36.66

These figures indicate quite clearly the absorption possibilities per domestic meter for appliances. They also indicate the popularity or the acceptance of the appliances listed. They point the weak spots which need bolstering for greater acceptance and sales.

Certain general tendencies are to be noted from the results recorded here. Furniture and household furnishings stores seem to be accepting electrical equipment as a part of the stock which they can handle profitably, even in the face of competition such as that in City B, where ranges are sold at cost. Department stores likewise are in a strong position to sell electrical merchandise, since they carry charge accounts of large numbers of customers and can extend terms which compete with any offered by the central station.

In each of the cities surveyed during the present year there have been opened one or two chain stores of the big mail order houses of the country. Although these had not entered the field early enough to be included in the present survey these stores are a factor which will have to be reckoned with in any future calculations. Already in the time these have been established the merchants in all lines have felt their competition.

Cities of this size, it must be remembered, are of the ideal size both for study of appliance sales conditions and likewise for the sale of appliances. Cities larger than these have a greater number of sales outlets but, former surveys reveal, the percentage of sales is smaller per dealer, although some particular dealers do more outstanding business in many cases. Likewise in larger cities it is more difficult for the central station to diffuse its influence in the promotion of the general appliance market, more costly to reach the public with its advertising and its sales efforts.

Typical as they are, then, these three cities present a cross section view of the appliance situation. Although more data will be gathered in the course of the further survey contemplated it will be from cities presenting other basic conditions and presenting therefore a different set of cross sections. This study should prove valuable to all branches and departments of electrical selling activity. The figures assembled here at least present a concrete and tangible basis upon which future discussion and plan may be laid.

Do your wash in an hour . . .
your ironing in less than 2 hours
with Thor WASHER
& IRONER
$1.00 down
A SHIRT in a Thor soon parts with its grimy hue at neckband and cuffs. Chiffons and fine underthings, this washer gently, carefully launders. It never takes more than 7 minutes to clean thoroughly a tubful of clothes. All you have to do is fill the lovely, apple-green, porcelain tub, switch on the controls, feed the pieces through the electric wringer. Pay $1 down now! Let Thor do your very next washing. $5.65 monthly, $99.75 cash.
From washer to ironer in a jiffy
To transform your Thor washer to an ironer, lift off the wringer and fit on the attachable ironer. One motion clamps do on shoe, starts roll. Has entirely open end for shirts, skirts, frocks. Ironer, $1 down, $3.25 monthly, $49.75 cash. Washer and ironer, $1 down, $8.40 monthly, $149.50 cash.
Peach stains are easy to get out
One little Spot Book tells just how to get them out of all sorts of materials. It will also tell you how to remove many other spots and stains. Ask for one. It's free.
Pacific Power & Light Company
"Always at your service"

You couldn't ask for a better offer
A slash in price of $22.50! A regular $145.00 quality Thor electric washer—a new model with new refinements—and now it's offered for $122.50.
You couldn't ask for easier terms
$3.00 down puts this finest of washers in your service—and with no additional down payment you get the Thor Rotary Iron. The Combination for $3.00 down. Balance spread over a long period.
You couldn't ask for a finer washer and ironer
Two million Thor washers have been made—and two million housewives are satisfied! Only Thor could have made such a washer as the Gyrator—such an ironer as the Rotary—and offered such quality at such a strikingly low price. Learn more about this great washer and ironer Combination today.
B.C. Electric STORES

Samples of advertising used by the B.C. Electric Railway Company and the Pacific Power & Light Company in selling the washer and ironer combination.

Sell the IRONER *With the Washer*

EXPERIENCES of four companies develop methods of solving the hitherto difficult porblem of ironer merchandising.

"SELL the ironer with the washer," is the advice of four power company commercial managers who have made recent outstanding successes in merchandising electric ironers. In their opinion, when the customer is sold a washing machine she is sold only one-half of a good idea unless an ironer is included with the sale. The perfection of the small and low-priced (in comparison with the older machines which have been available) ironers that are interchangeable with the wringer has solved the hitherto difficult problem of ironer merchandising, in their belief. To the customer who already owns a washer they are selling the table-top ironer. An account of the experiences of these four companies in washer and ironer merchandising follows.

The campaigns discussed cover different phases of merchandising effort. In the first the program followed by a company in making its initial bow to this type of business is outlined. The same is true of the last campaign reviewed. Ironer selling was somewhat of a novelty to the second company. However, in the case of the third company the results of two years' experience is presented. From the ideas offered it will be possible for any dealer or power company to outline a washer and ironer campaign.

COLORADO CAMPAIGN SETS RECORD

In the past the percentage of ironer sales to washing machine sales on the lines of the Public Service Company of Colorado has been about one to ten. To correct this condition and to get the benefits of the larger current consuming possibilities of the electric ironer, G. B. Buck, new business manager, and E. E. Rowland, merchandise

manager, conceived the idea of featuring the "home laundress," a combination that not only performed the scrub-board and rinse part of the weekly washing electrically, but one that solved the ironing problem, too.

Today, in Denver, citizens have a rather clean-cut notion that a "Thor Laundress" is epitomized by a smiling, neat-appearing colored lady, washing and ironing simultaneously by means of a shiny, covered tub at her right and a mangle in front of her. A great many people saw Mrs. Georgia Madison demonstrating in the show window of the Public Service Company of Colorado during the "Thor Laundress" campaign, and the net result was that some $36,000 worth of the appliances were sold within a 60-day period. And the percentage of ironers to washers lacked little of being one to two.

The dusky Mrs. Madison—selected by Mr. Rowland as an exemplary laundress—attracted a huge gathering of women. She put across her message: Wash day as a day dream and not a nightmare. Such men as were among those present at demonstrations were family men, interested in lightening a helpmate's housework. Something over $6,000 worth of washers and ironers were sold on the salesroom floor. Many other sales were directly traceable to the demonstration.

Abandoning the conventional first, second and third awards to salesmen, $175 in bonus money took a different course: $100 was split 100 ways. One dollar went to each salesman who presented an accredited sales slip. A double bonus was given the man who sold the complete "Thor Laundress."

The remaining $75 bought special prizes—a telechron clock, gasoline coupon books, an urn set, and various other gifts, awarded to the biggest producers under given conditions. The men who brought in orders for *both* washer and ironer were praised, bonused and spurred to further efforts.

This demonstrator for the Public Service Company of Colorado used her paycheck to purchase "a home laundress."

At the campaign's end, 233 washing machines had been placed in Denver homes—and 101 ironers went the same route.

"The New Thor Laundress—Comes Once—Stay Always" was the slogan of the newspaper advertising. The same slogan was used in broadsides mailed to residential customers. A free drawing took place and, as luck would have it, a woman who had gazed at the demonstration with wistful eyes but turned away for lack of funds, won the "Thor Laundress." Incidentally, Mrs. Madison—sold by her own demonstration—used her paycheck toward buying an outfit.

Experience of Portland Electric Power Company With New Washer and Ironer Combination

The Portland Electric Power Company has only recently attempted to merchandise washing machines and ironers aggressively, so that comparative experience of this year with former years is useless. A campaign on Thor washers and ironers was conducted during the period July 10 to Sept. 1 this year. List prices were maintained, and the only particular inducement offered customers was in the terms of $1 down with the balance in eighteen months. Newspaper advertising, car cards and store and window decoration at company stores called attention to the activity. Prizes and bonuses were offered to employees in and out of the sales department for store and window displays, for prospects turned in and later sold, and for extra sales above quotas in the various districts.

A quota of 410 units was set up for all districts during the campaign period, a unit being either a washer or an ironer, with a combination sale counting as two units. During the campaign period 541 units were sold, each district exceeding its quota. A record of the number of each appliance sold was not kept so that it is impossible to say how many of the "units" were washers and how many were ironers, but G. A. Kumler, merchandising manager, estimates that about 60 per cent were washers. The bulk of the ironers sold were either of the type interchangeable with the wringer of the machine, or of the type designed to rest on an ordinary table. Very few of the larger ironers were sold.

Mr. Kumler states that the campaign was designed to fill the usual summer valley in the merchandise sales curve, and that it was successful from this and other angles. He believes the present washer and ironer combination, and the small table ironer for the customer who has a washing machine on which it is impossible to use the ironer in place of the wringer, meets a very definite customer demand, and at a price the customer is willing and able to pay.

Pacific Power & Light Company Sells Washer and Ironer Combination

The Pacific Power & Light Company has been merchandising washing machines for a number of years. Regular annual campaigns have been resorted to for fifteen years, but it has been only since 1922 that a sales staff has been in the process of organization, so that annual sales from that year to the present are in a measure comparable. Annual washing machine sales for the past seven years have been as follows:

1922	426	
1923	727	(High point.)
1924	554	(More pressure with less results.)
1925	520	(More pressure with less results.)
1926	460	(Still more pressure. The need for a cheaper machine to compete with the more popular types then being sold began to be felt.)
1927	572	(The company took on more territory in 1927.)
1928	1,891	(The new Thor was sold by the company in April, 1928.)
1929 (est.)	2,600	(Practically all sales are of the new type machine.)

Practically the entire story of the effect of a new, low-priced, agitator-type washer on the company's washing machine business is contained in the above table.

The history of ironer sales is similar except that prior to 1927 ironer business was negligible. Sales in the past three years have been as follows:

1927	90	
1928	542	(The new washer and ironer combination and table-top ironer were introduced in the company's territory in September, 1928.)
1929 (est.)	1,000	

Ironer sales are now running about one-third of washer sales. Only a few of the larger type ironers are being sold, the bulk of the sales being divided between the type interchangeable with the wringer and the table type. At first it was thought the table ironer would be the more popular of the two small types, but this has not been the case, as sales of the attachable type have been greater.

The effect of the introduction of the new products into the merchandising activities of the Pacific company is graphically portrayed in the accompanying table of sales of both ironers and washers by months in the year 1928 and 1929.

Washer and Ironer Sales, Pacific Power & Light Company

	1928		1929	
	Washers	Ironers	Washers	Ironers
January	41	4	41	17
February	34	3	244*	80*
March	27	2	302*	91*
April	319**	4	141	31
May	231**	1	120	19
June	79	3	132	22
July	58	7	131	33
Total, first 7 months	789	24	1,111	293
August	46	5		
September	274***	95***		
October	426***	219***		
November	293***	161***		
December	63	38		
Total, year 1928	1,891	542		

* Spring washer and ironer campaign.
** Introduction of new washer with spring campaign.
*** Introduction of new ironer with fall washer and ironer campaign.

B.C. Electric Company Campaign

Exceeding the objective in washers, but falling short of the expected quota in ironers, the merchandise department of the British Columbia Electric Railway Company made some valuable discoveries in a recent campaign for the sale of combined washing and ironing machines.

The department set its objective at 200 washers and 100 ironers. The sales were 208 washers and 49 ironers. In this instance the Thor line was featured and the combination was the No. 2 washer and the No. 0 ironer. Actually 35 of the combination machines were sold, but the drive was also instrumental in the sale of seven table ironers and seven large ironers.

In addition to the sales force of twelve outside men the seven retail stores of the company put on special demonstrations, the larger stores giving window demonstrations. This latter feature proved a valuable drawing card and provided many good leads. Special inducements were offered to both inside and outdoor staffs.

The main offensive was carried on by direct mail through the medium of initial and follow-up broadsides, but in addition about 100 in. of local newspaper advertising was carried. This campaign was essentially a "low terms" drive, the down payment of $3.50 applying to either single units or the combined machine.

Crinolines and Candlelight

The '49er and His Bottle Lamp

The Betty Lamp of Pilgrim Days

Barnstorming

ONE NIGHT STANDS, they used to call them when Fank Bevan himself trouped the "opera houses" of other days. They are longer stands than one night now, the shows he presents at the district offices of the Pacific Gas and Electric Company in a most unique lighting campaign, but the principles of good showmanship learned from the barnstorming days still apply and still bring the audiences—and the results.

The Pacific Gas and Electric Company is the only central station on the Pacific Coast which can be said to be promoting domestic lighting on an important scale. The problems of this work have perhaps discouraged much effort in other companies. Many companies even have decided that domestic lighting cannot be done. It is being done by this company but it is being done in a way which would only have occurred to a showman.

When Mr. Bevan, lighting specialist for the company, visited the Nela Park and Harrison, N. J., laboratories of the Mazda lamp companies, he was told that of the thousands who visit these schools of illumination but a small percentage are connected with the electrical industry. It is the public that shows the greatest interest.

All the way home Mr. Bevan wished he might pack up these lighting institutes in his suitcase and bring them home to his own public, the customers of the "P.G.

Coal Oil Lamps of the Seventies

When the Gas Was Turned Low

With LIGHT

and E." By the time he had reached San Francisco a plan had been evolved. Now in each division office an institute is being carried to the public. Furthermore, it has all been designed to accompany and to capitalize upon the public interest in "Light's Golden Jubilee."

The plan started operation with a Mazda lamp school held in each division for counter people, lighting salesmen and supervisors to increase over-the-counter sales of lamps. This two-and-a-half-hour schooling was called at the discretion of the division manager and covered "the importance of lamp merchandising to the utility," "carton sales," "higher wattage lamps," "use of pink slip in supporting the sales plan," "cash profit to counter people" and "principles of lamp merchandising." An itinerary was laid out and assistance of lamp manufacturers' representatives obtained for the school sessions.

Although this company's lighting program embraced commercial and industrial lighting coincident with the domestic program, only the latter will be considered here. The domestic lighting activity was opened following the mailing of 25,000 broadsides on "How to Tell If Your Home Is Properly Lighted." These were followed up by field salesmen, and then another 25,000 broadsides on "Light's Golden Jubilee" were sent out. The first broadside offered three days' free trial of the

When Twilight Falls—Tonight

duplex lamp sold by the company. The second had a card enclosure on which requests for demonstration could be sent in.

In "P. G. and E. Progress," a monthly magazine reaching 440,000 people in the company's territory, besides special lighting articles each month, the October issue is to be a special "Jubilee" edition. In each issue appears a coupon upon which a request for the handsome brochure, "The Romantic Evolution of Light," may be made. These coupons are sent to the main office where a label in triplicate is made out. The original label is pasted on the envelope in which the brochure is mailed, the duplicate is kept as an office record, and the triplicate

The traveling "bungalow" which presents a corner of each room of a house. The "bathroom" is the first point of contact, and in it is the bare lamp, the bracket over the mirror, the two brackets and a ceiling fixture, with which to illustrate all possible lightings.

is sent to the division manager with a request that a lighting salesman be sent one week later to follow up the lead.

"The Romantic Evolution of Light" deserves all the favorable comment it will receive. It is an unique achievement in lighting literature, primarily because its entire story is told by dramatic photographs careful in execution and accurate in detail, and secondly because it sweeps so gracefully from historical and dramatic interest into a convincing sales message for the type of lighting equipment sold by the company.

The progress of lighting is told in 28 pictures, six of which have been reproduced here by permission. The pictures occupy practically all of the 8 x 11-in. page, only a short caption telling the interesting facts concerning the mode of illumination illustrated by each. A quotation will indicate how tersely the story is told:

"Argand, a chemist, invented an oil burner which produced a hollow, cylindrical flame. It also had a central draft of air, which helped produce a better light. In 1783 he placed a chimney, made of a broken bottle, around the vertical wick and the flame steadied, became brighter and ceased smoking. This was the first real contribution to better lighting in six thousand years."

Another of the captions, over a picture illustrating today's dining room well lighted, makes its sales message in these words:

"For one cent an hour this electric lighting unit offers you the light of 266 tallow candles. The same amount of light from candles would cost $3.70 per hour. And the use of candles would not result in the even distribution of light that you can obtain from this single modern lamp. If you were a guest at this dinner party you would appreciate the evenly diffused light, the total absence of gloom and glare, and the total absence of shadows upon the table. Note how the beutiful furnishings are clearly visible in detail."

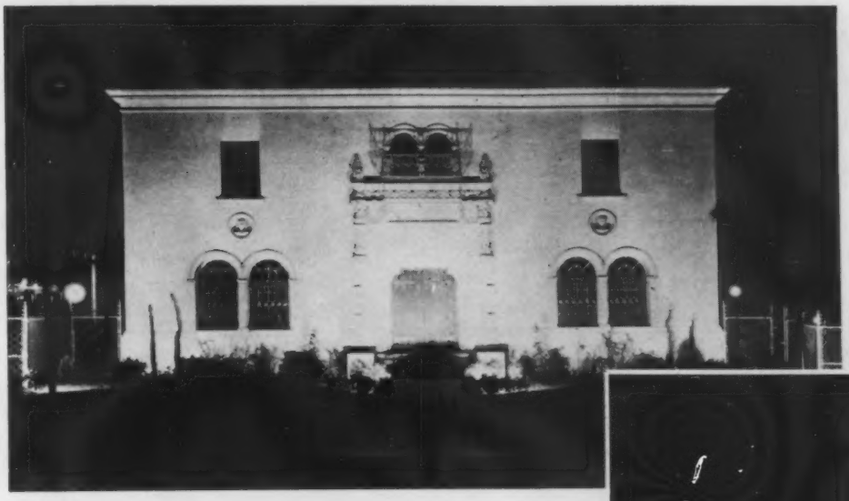
Only the last page of the booklet is devoted to a description of the lighting equipment and its characteristics and design. Again, as in an introduction dedicating the booklet to Edison, the point is made: "Most people use incorrectly Mr. Edison's invention—the incandescent electric lamp. It was intended primarily as a dependable source of light to be *controlled* properly so it would not injure the eyes."

Fifty thousand copies of this brochure have been printed in the first edition. Because of the expense of producing and the unusual character of the pictures the Pacific Gas and Electric Company has copyrighted the entire book.

The last and most spectacular phase of the lighting program is in the actual "barnstorming." For this a portable traveling show has been devised, made up of stage flats and properties borrowed from local merchants. The "show" consists of a bungalow exterior which is set up in the district office window which demonstrates porch lighting, illuminated house number, convenience outlets for use with exterior decorative lighting such as Christmas trees, etc., and a bungalow "interior," as shown in the illustration. By this ingenious device a touch of all rooms of a house except the kitchen is given. The first point of contact is the bathroom. The visitor is taken before a mauve washstand to be demonstrated the contrast between a drop cord, an over-the-mirror bracket, two side brackets and an overhead fixture.

Advertised in local papers, this traveling show attracts people from all over the district, classes from schools and groups from various interested trades, clubs and associations. The procedure of the show takes all visitors first to the historical exhibit of lighting pieces, then to the bungalow exterior and last to the interior with all of its rooms explained and demonstrated.

Instead of the shadow-box to demonstrate window lighting here is a portable window, with tile front and equipped with real merchandise to be lighted properly and improperly.



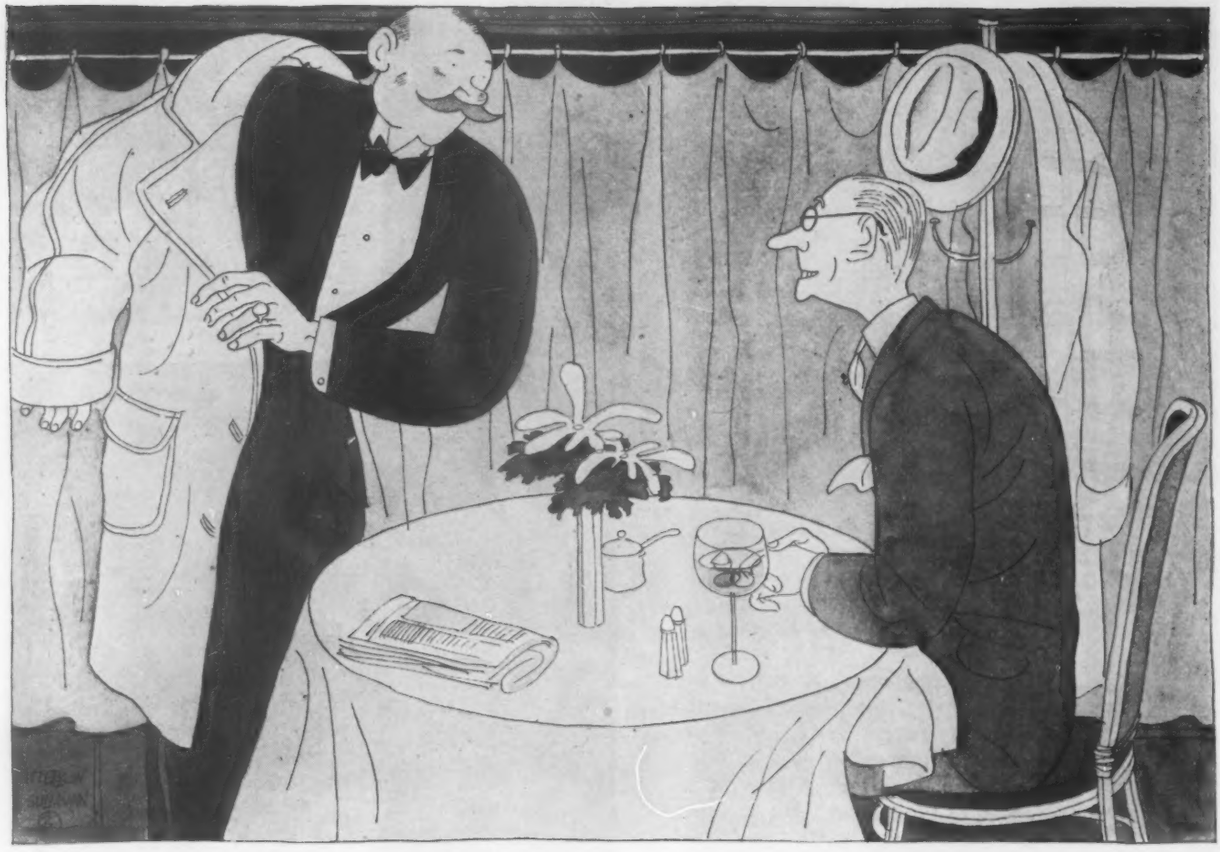
Station "F" of the San Diego Consolidated Gas & Electric Company in the heart of the residential district

Light Up

AS THE most important branch of the electrical industry, the power companies can take the lead in celebrating Light's Golden Jubilee. Operating properties offer splendid opportunities for floodlighting. Steam plants, hydro stations, substations, an office building, some local monument or park, may be bathed in light. The accompanying pictures show some examples of floodlighting by Western power companies.

The floodlighted stack of the Seal Beach plant of the Los Angeles Gas and Electric Corporation is visible for miles.

Spokane Falls, in the heart of Spokane, have been floodlighted by The Washington Water Power Company.



Electrical Jekylls *Who Ought to* Hyde

By W. A. Cyr

IT'S an old gag but it'll do to start this right side up. Suppose you went into your friend Bill's restaurant and found him putting on his coat. And when you asked why, he told you he was going out to get something fit to eat.

It's such an old gag that it doesn't draw a laugh any more. Most people think it too improbable even to be funny. They don't know the electrical industry though. If they did what a laugh they'd get.

For believe it or not, this is one industry that sells one thing and uses anything else but. Why, there are high executives of power companies who spend good money to put some of these cash-and-carry compressed gas range outfits in their homes. Even if electricity cost a dollar a kilowatt-hour, which it doesn't, they could not do anything sillier than that. And yet they do.

Lots of electrical executives have built swell homes and refused to let the contractor wire them Red Seal. It doesn't sound like good sense but it is being done right today.

The number of high-up electrical men who couldn't sell the wife on using an electric range is just too terrible even to think about.

And there's even the case of a manufacturer of electric refrigerators whose own kitchen still has an old-time ice box in it. He blames the wife, too.

Other industries aren't like that. Henry Ford rode around in an old Model T until he couldn't stand cramping his legs around the steering post any longer. Then he bought out the Lincoln plant so that he could ride in a car that he made himself—and still have leg room.

I know the manufacturer of a patent wall bed who even goes so far as to sleep in one of the contraptions. What's more, his wife sleeps in one too.

You wouldn't catch an automobile salesman riding a bicycle,—nor a typewriter company sending out letters written in long hand. Neither would you find a plumber without a bathtub nor a barber using a safety razor. Bakers eat their own bread, farmers eat their own produce, and manufacturers use their own products everywhere. There are even policemen who obey the laws.

You could understand an ice man, for instance, having

an electric refrigerator on the sly, or a gas man defying opprobrium and risking his very social standing because his wife insisted on having an electric range and air heaters. That's what progress will do to you once it gets in the blood. But it makes it all the more a mystery why electrical men try to sell electrical convenience out of a catalog, with a dictionary to tell them what the words mean.

These be broad statements. To cast aspersions and a dirty look over the whole electrical industry like this without just and sufficient cause would be rather rough if it weren't so true. Even the statisticians have worked up data on the situation, and you know what that means. There just isn't anything that could be more damning than that.

The close-cropped, horn-spectacled statistician, poising his Adam's apple for a death dealing word, comes out with the fact that in the eleven Western states there are, in round numbers, 27,000 employees of power companies. Add to this some 8,000 others, sometimes known as "camp followers" but in reality representatives of manufacturers, jobbers, dealers and publishers. Total: 35,000 electrical people alive and eating.

Further inquiry into the intimate personal affairs of these folk reveals them 70 per cent married and living with their wives. Remarkable and commendable, as far as it goes.

Nosing still further into their private lives it is found that at least 75 per cent of the power company employees maintain homes. The manufacturers' and jobbers' men may be on the road most of the time so they weren't counted. Moreover, 40 per cent of the employees are brave enough to own their own homes.

Right here is where a lump rises in the statistician's throat, if such a thing can be imagined. Going right into the very kitchens of these people it is found that less than 10 per cent use electric ranges and less than 15 per cent of the married cook electrically.

The remarkable thing, mentioned a moment ago, is that they remain so handicapped in domestic ease and comfort and still married. It speaks well for the human race even if it does look bad for the electrical industry.

In the gas complex of course there is a really difficult situation from the standpoint of the electrical industry. So many power companies, so to speak, are leading double lives. They are trying to achieve the difficult process of being true to two sources of heat at the same time.

A sales manager for such a power company must indeed lead a sort of "Jekyll and Hyde" existence, with a gas meter in his left hip pocket and an electric meter in the right.

So much for the degrading facts. The question becomes one of what can be done about it. Goodness knows those in the electrical industry have had their chance to go straight. In most companies real inducements are offered to employees to purchase electric ranges; in most cases at cost and in some cases even below cost.

Some companies too have taken this up in a serious way. Looking the employee square in the eye they have told him that the best way to know the value of electricity is to try some.

The Pacific Power & Light Company was so earnest in this little eye-looking stunt that 80 per cent of its married employees not only tried electricity but like it so well that they tell others about it. The California Oregon Power Company has 71 per cent of its employees acting that way too. In one district of the Southern California Edison Company 100 per cent of the married employees use and boast of their electric ranges. In the case of the Utah Power & Light Company, already 65 per cent of its employees who have homes use electric ranges.

These are high spots. As for the low spots—but why go that low?

This industry lives in a glass house these days. As one man put it, we have no more privacy than a gold fish in an illuminated bowl. What the executive has in his house the trouble man knows. The neighbors have more effective ways even than that to find out what he has in his home.

The boss who put in canned gas didn't fool anybody in his own company and the compressed gas man told the rest of the world.

The engineers and other brass hats who were too good for Red Seal were found out by the meter readers long after the building contractors had spread the poison to a dozen other jobs.

Least of all the employees of an electrical company can the executives afford to cook lamb chops with stove wood while they send the boys out to boost range load.

—and even policemen who obey the law.

Down through the industry the good example percolates. And only through the industry, thus saturated with the electric idea and oozing it at every pore, can the big wide world be made to appreciate the worth of something good enough to be used by ourselves.

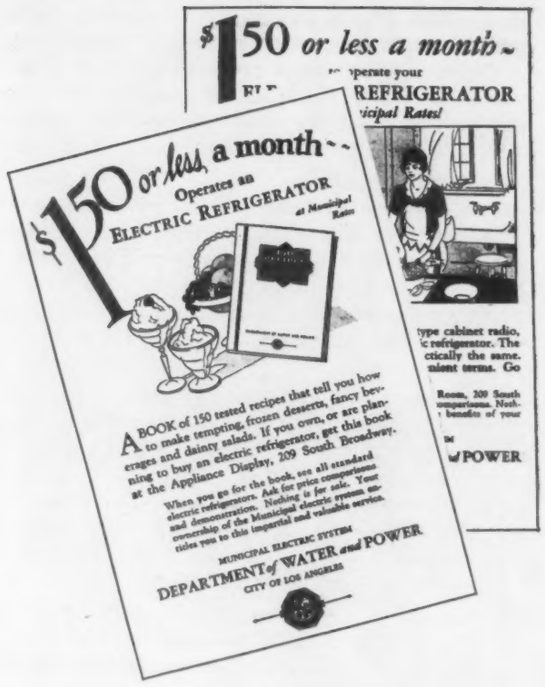
"Ask the man who owns one" is still selling one of the highest priced automobiles. Electric cooking can best be sold by the man who eats it.

Perhaps after all the reason Bill the restaurant keeper went out for lunch was because he didn't use an electric range himself.

Co-operative Advertising Sells

Refrigerators

BUREAU of Power & Light and eight distributors in Los Angeles expect sales to total 12,000 units in nine months' campaign costing $100,000.


$1.50 or less a month
Operates an
ELECTRIC REFRIGERATOR
at Municipal Rates
A BOOK of 150 tested recipes that tell you how to make tempting, frozen desserts, fancy beverages and dainty salads. If you own, or are planning to buy an electric refrigerator, get this book at the Appliance Display, 209 South Broadway.
When you go for the book, see all standard electric refrigerators. Ask for price comparisons and demonstration. Nothing is for sale. Your ownership of the Municipal electric system entitles you to this impartial and valuable service.
MUNICIPAL ELECTRIC SYSTEM
DEPARTMENT of WATER and POWER
CITY OF LOS ANGELES

WHAT can the industry expect from the national food preservation campaign? Perhaps some answer to this question can be found in the result of a co-operative refrigeration activity that has been under way in Los Angeles for the past five months. In that city the Bureau of Power and Light has developed and sponsored a campaign in co-operation with eight manufacturers and distributors of electric refrigeration equipment. Approximately $100,000 will be spent in advertising and sales promotion before the campaign ends. It is anticipated that by the end of December total sales will be in excess of 12,000 domestic units as against an initial bogey of 5,000 units set at the beginning of the campaign.

When plans for the activity were initiated all manufacturers of electrical refrigerators having representation in Los Angeles were asked to co-operate. The response was unanimous, with the following organizations joining in the promotional plans. General Electric Company, Collins-Kelvinator Company, Frigidaire Corporation, Copeland California Sales Company, O'Keefe & Merritt, Zerozone Electric Refrigerator Company, Electro-Kold Sales Company, and J. O. Case, Inc., distributor of Servel and Electrolux refrigerators in southern California.

While the campaign embraced newspaper, magazine, direct-mail, poster and radio broadcast advertising, the direct-mail phase was considered the pivotal point of the activity. From the files of its 227,000 users of domestic electricity the Bureau took the names of those whose bills averaged $2.50 monthly. These totaled approximately 60,000 and formed the nucleus of the mailing list. The contention was that families using this amount of electricity each month constituted a class that could afford to purchase a refrigerator. The eight manufacturing concerns co-operated in the direct-mail campaign by furnishing the material for a four-page letter sent out once each thirty days to all of the 60,000 consumers on the mailing list. The Bureau printed a sales talk on the first page of each letter. The inside double spread was used by the co-operating firm for setting forth the advantages of its product. Instituted in April, the campaign was designed to cover a period of nine months and involved the mailing of 540,000 pieces. The mailing cost of the Bureau of Power and Light for the broadsides alone is estimated at approximately $31,000 and the paper and printing cost of the eight manufacturers about $1,200 each. Business reply cards were included in every envelope. These were returnable to the refrigerator distributor whose advertising appeared on the inside pages of the letter. In every instance the distributor was expected to do his own selling. The co-operating manufacturers will send out altogether additional follow-up direct-mail broadsides to the amount of 250,000 before the campaign is ended.

The city was divided into eight direct-mail districts. By a system of rotation each manufacturer or distributor of refrigerator equipment will cover the entire city by the end of the campaign. His broadside is directed to one of the eight districts every month. This plan has been followed in order to insure absolute fairness to all co-operating organizations.

An intensive 20 weeks' campaign of newspaper advertising reaching more than 1,000,000 readers is being conducted in eight Los Angeles daily papers. Sixty community newspapers as well as five monthly magazines edited in the city also carry advertising. More than $25,000 will be spent by the Bureau in this newspaper and magazine advertising. In addition, the associated refrigerator distributors also contribute individual advertising to tie in with the Bureau's general sales advertising.

Radio broadcasting is playing an important part in this campaign. Eighty-word announcements every day for sixty days are being broadcast from seven Los Angeles stations. These short talks feature the economies of electric refrigeration. Once each week a fifteen-minute talk on the same subject is given. The estimated cost of this broadcasting is placed at $1,000.

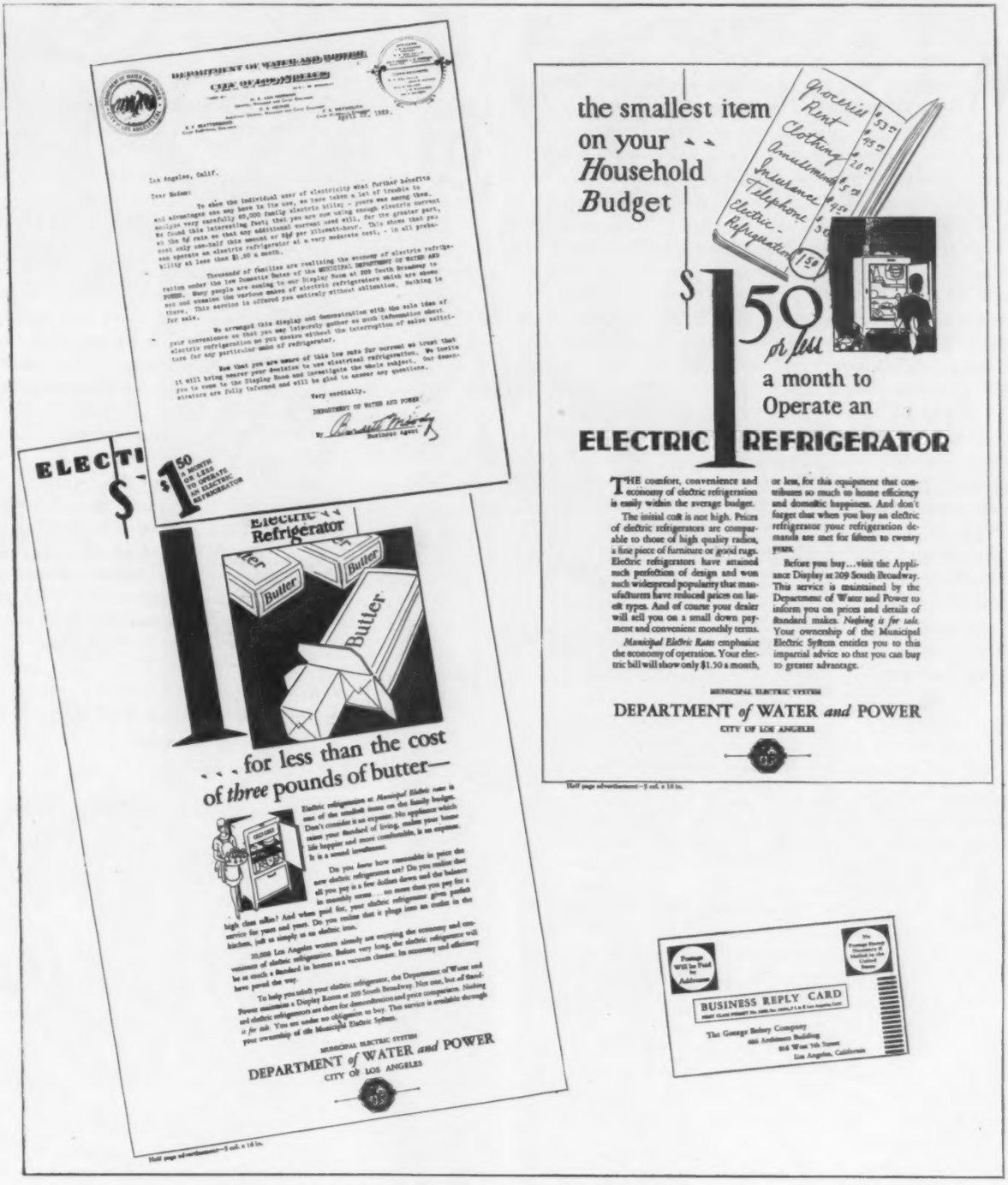
A booklet containing 150 recipes suitable for use with an electric refrigerator has been prepared by the domestic science section of the Bureau. This book is given out in response to requests made through newspaper coupons or letters from customers hearing the radio announcement.

Outdoor billboard advertising was featured during the month of May. Forty-six billboards were used along the heavily traveled highways in and about Los Angeles.

During the month of September the campaign was tied in with the National Food Preservation Program.

Sales to date are such as to indicate that by the time the campaign ends approximately 12,000 domestic refrigerators will have been sold in the city of Los Angeles.

Based upon conservative averages, it is estimated that refrigerator sales in Los Angeles during the period of the campaign will be in excess of two and a half million dollars. In addition the Bureau of Power and Light will have added to its lines equipment the consumption of which will exceed $216,000 annually.


DEPARTMENT OF WATER AND POWER
Los Angeles, Calif.
Dear Madam:
ELECTRIC
$1.50 PER MONTH OR LESS TO OPERATE AN ELECTRIC REFRIGERATOR
Refrigerator
Butter
. . . for less than the cost of three pounds of butter—
MUNICIPAL ELECTRIC SYSTEM
DEPARTMENT of WATER and POWER
CITY OF LOS ANGELES
the smallest item on your Household Budget
Groceries
Rent
Clothing
Amusement
Insurance
Telephone
Electric Refrigerator
$1.50 per day
a month to Operate an
ELECTRIC REFRIGERATOR
THE comfort, convenience and economy of electric refrigeration is easily within the average budget.
The initial cost is not high. Prices of electric refrigerators are comparable to those of high quality radios, a fine piece of furniture or good rugs. Electric refrigerators have attained such perfection of design and won such widespread popularity that manufacturers have reduced prices on last-call types. And of course your dealer will sell you on a small down payment and convenient monthly terms.
Municipal Electric Rates emphasize the economy of operation. Your electric bill will show only $1.50 a month, or less, for this equipment that contributes so much to home efficiency and domestic happiness. And don't forget that when you buy an electric refrigerator your refrigeration demands are met for fifteen to twenty years.
Before you buy... visit the Appliance Display at 209 South Broadway. This service is maintained by the Department of Water and Power to inform you on prices and details of standard makes. Nothing is for sale. Your ownership of the Municipal Electric System entitles you to this impartial advice so that you can buy to greater advantage.
MUNICIPAL ELECTRIC SYSTEM
DEPARTMENT of WATER and POWER
CITY OF LOS ANGELES
BUSINESS REPLY CARD
The George Belony Company
Los Angeles, California

Half-page advertisements and direct-mail material used in campaign.

Red Seal Means More

Wiring – Consumption – Appliances

By VICTOR W. HARTLEY
Executive Secretary, California Electrical Bureau

WHEN the Red Seal Plan was first launched in 1926 it was regarded by many as just another one of those pegs on which to hang publicity for better wiring. Now, after three and a half years of promotion, it has proved itself to be a sound market development program for the electrical contractor, for the manufacturer of wire and wiring devices, for the central station and for the manufacturer of appliances.

Moreover, the Red Seal Plan possesses this distinct advantage over most promotional activities: Its returns can be computed, tabulated, studied and weighed against physical and financial expenditures to determine its true worth. This has been done on three different occasions and has produced some highly interesting results.

For the sake of brevity and clarity, this discussion of the outcome of the Red Seal Plan in California is divided so as to interest the following three groups of the industry: First, those directly concerned in seeing more wire and wiring devices go into every job; second, those directly interested in seeing more kilowatt-hours go out through every job; and finally those directly interested in the manufacture and sale of domestic current consuming devices.

The interests of the first two groups were studied in surveys made two years ago and one year ago respectively, and were reported in detail at the time. To make the Red Seal picture complete, however, they will be reviewed briefly at this time. The third survey, just completed, illustrates in fact the theory often advanced that appliances cannot be sold readily to owners of homes that are not adequately wired for their use. The results of this latter survey will be presented in detail.

The electrical installations in 500 homes, taken at random over the state while under construction, were reported on in complete detail. The reports, grouped accoring to whether or not any Red Seal effort had been made on the job, showed the Red Seal Plan to be directly responsible for an average increase per job of 18.7 lighting outlets, 6.6 switch outlets, and 11.9 convenience outlets. The average number of lighting circuits per home was increased by 2.3 and convenience outlet circuits by 2.2.

Ninety-six per cent of the non-Red Seal homes had ¾-in. main service conduit, whereas Red Seal effort resulted in 33 per cent of the homes having 1¼-in. and 55 per cent of the homes having 1½-in. conduit. Red Seal homes were 100 per cent wired for ranges, 43½ per cent wired for water heaters, and 48 per cent for air heaters.

At the time the first survey was made the homes were just being built and had no current-consuming history. One year later, however, the same list of homes was checked upon the power company records and it was found that where no Red Seal effort had been made the average monthly consumption was 64 kw.-hr. and the average bill $3.20. In the Red Seal group of homes the average monthly consumption was 495 kw.-hr. and the average bill $11.21.

The first two surveys showed clearly the profits to be derived from the Red Seal Plan by wire and equipment manufacturers and wholesalers, contractors, and power companies. The second survey indicated, also, that Red Seal home-owners are purchasers and users of a greater number of appliances than occupants of non-Red Seal homes. A monthly utilization of 431 additional kilowatt-hours undoubtedly resulted from more current-consuming devices. What are these appliances? To just what extent does Red Seal increase the appliance market? These questions formed the basis of the third survey.

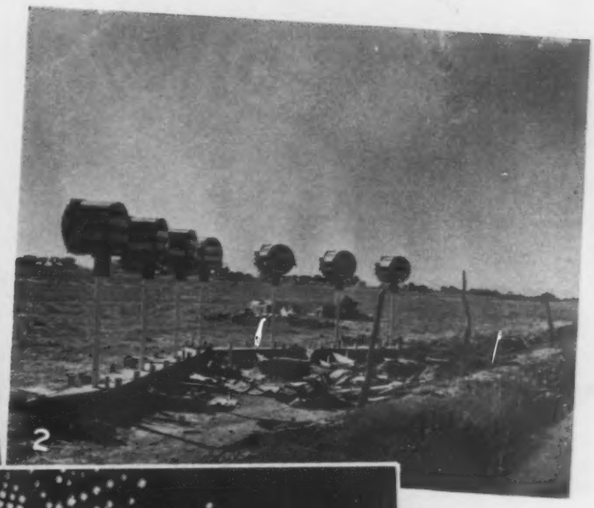
In order to maintain a balance and uniformity throughout all of the surveys, the same list of homes was again used and a questionnaire was mailed to all occupants requesting a complete list of all electrical appliances they are now using. The replies showed a general average of ten appliances per home, with an average of eight appliances in each non-Red Seal home and an average of 12.5 appliances in each Red Seal home.

Appliance Saturation of Red Seal and Non-Red Seal Homes

	Percentage of Homes Equipped	
	Non-Red Seal Homes	Red Seal Homes
Air heaters	29.0	75.0
Chafing dishes	4.0	6.2
Clothes washers	25.0	56.2
Cream whippers	.....	12.5
Curling irons	46.0	54.0
Dishwashers	.....	6.2
Fans	8.3	37.5
Grills	8.3	12.5
Hair driers	16.6	12.5
Heating pads	16.6	60.0
Hotplates	8.3	18.7
Ice-cream freezers	.....	6.2
Irons	100.00	114.0*
Ironing machines	4.0	6.2
Percolators	66.6	78.0
Ranges	12.5	78.0
Refrigerators	8.3	84.0
Sewing machines	71.0	50.0
Soldering irons	8.3	12.5
Toasters	87.5	72.0
Utility motors	4.0	18.7
Vacuum cleaners	100.0	100.0
Ventilating fans	4.0	25.0
Vibrators	.....	25.0
Waffle irons	58.3	81.2
Water heaters	.....	43.2
Electric clocks	.....	12.5
Cooker pots	8.3	12.5
Floor polishers	12.5	25.0
Electric radio sets	66.6	72.0
Battery chargers	37.5	37.5

* Some Red Seal homes reported having two irons.

Light Finds Its Way Into New Places



Above: Mexicali, capital of Baja California, Mexico, is an up-to-date city with its recent electrolier installation. The system runs from the American border to the governor's palace. Besides this system seven airport floodlights have been installed at the government airport.

At left: Lighting possibilities in present-day buildings abound. The Palace Hotel, San Francisco, recently had its dining room lighting redesigned and rebuilt. Innumerable color pattern combinations in the skylight ceiling, at the control of the orchestra, provide variety and color to the dancing.

Below: A night view of the approach to the new San Francisco Bay Bridge which has an excellent highway lighting equipment on it.

Below: Night baseball is a regular outdoor feature in Corcoran, Calif., since the installation of field floodlights.

"MAKE this an Electrical Christmas." "Electrical Gifts for Christmas." These are old sayings to the electrical industry. Past campaigns and sales activities have impressed upon the minds of the buying public that electrical appliances do make good Christmas presents. Otudoor Christmas tree competitions and other similar activities are doing much to tie the electrical industry into the Christmas spirit. The problem now is to turn some of the great tide of holiday funds into electrical channels, —to make the electrical Christmas real for all branches of the industry.

To this end ELECTRICAL WEST has secured from manufacturers information on the newest and latest appliances that have been brought out for the holiday trade, as well as those appliances on which manufacturers are expending particular sales and advertising effort for the holidays. In the pages that follow will be found any number of new and novel appliances from which to select a holiday stock.

And the good job the electrical manufacturers are doing is witnessed by the wide variety of appliances described. There are many others not included in the following pages. There are electrical toys of every description, waffle sets, appliances decorated to match dishes and glasses, in fact scores of electrical devices with some appealing or attractive feature that is certain to attract holiday trade.

In the description that accompanies each photograph or drawing there is included the name and address of the manufacturer. For the majority of the appliances described ELECTRICAL WEST has also in its files the names of the Western distributor or representative. The editors will be glad to furnish the names of such Western distributors to anyone interested upon request.

IN COMPILING the catalog of new and novel electrical appliances that appears on the following pages, the editors of ELECTRICAL WEST solicited and secured the co-operation of a large number of manufacturers. The editors wish to take this opportunity of thanking all of those manufacturers whose co-operation has made this presentation possible.

In presenting information regarding these appliances, brevity has been essential in order that the listing might be as large as possible. Consequently descriptions have been limited to a brief outline of the novel features of the appliances. In every instance additional information in the form of booklets or other descriptive literature may be secured from either the manufacturer or the Western distributor.

The appliances pictured on this page are described on the page immediately following.

Hotpoint Christmas Range

CHROME finish trimmings, all nuts, screws and bolts entirely concealed, Calrod oven units, high-speed Calrod burner units, and royal blue double-coated enamel oven lining are features of the new Hotpoint Christmas range, advance 1930 model, illustrated on opposite page. A thrift cooker and smokeless broiler pan are included as standard equipment with the range.

The range is finished in white enamel with French grey trim, and temperature indicators of burners are on octagonal scutcheons of chrome plate. Automatic oven-timer clock is in modernistic design. Retail price of the four-burner model illustrated is $197; three-burner model, $177; clock and timer, $10 extra. Made by the Edison Electric Appliance Company, Inc., 5600 West Taylor St., Chicago.

G-E De Luxe Fan

THE fan shown at the foot of page 184, suspended in a grained walnut finish casing, is made by the General Electric Company, at Bridgeport, Conn. The fan motor body and the blades are of dark bronze color. The yoke containing the motor and casing may be tilted above or below the horizontal position by means of adjusting knobs, or can be swiveled on the base to direct the breeze in any direction. The operation is very quiet, only the swishing sound of the air passing through the frame being heard.

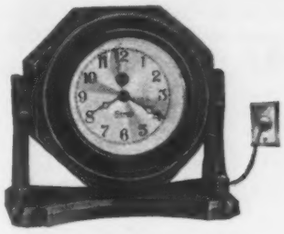
Three-In-One Table Appliance

CRISP, delicious waffles, golden-brown griddle cakes or crispy toasted sandwiches can be made right at the table with the combination waffle iron, griddle and sandwich toaster manufactured by Landers, Frary & Clark, New Britain, Conn. The cooking plates can be reversed in a moment's time to put in use either the waffle grids or the plain grids for sandwich toasting. From the sandwich toaster position the top is turned back, leaving two grids on which to cook two pancakes at once. The base serves as a tray to catch stray cooking crumbs. Retail price, $18.

Kenmore Electric Clocks

OF GOTHIC design with mahogany or walnut finish case is this Lansdowne model Kenmore time piece with synchronous motor which operates direct from the electric outlet. Furnished with or without melodious hour and half-hour chime strike. List price, without chime strike, $30; with chime strike, $42.50.

Princess Pat is a neat model with



Bakelite case obtainable in mahogany or walnut finish or any one of twelve colors for boudoir, desk or den. List price $17.50. Other models of Kenmore clocks, made by The Kodel Electric & Manufacturing Co., Cincinnati, Ohio, range in price from $15 to $250. All have second indicator.

Washer With Rotary-Ironer Attachment

IRONING ease and comfort are provided by the Horton rotary-attachment ironer—a companion piece to the Horton agitator washer, made by the Horton Manufacturing Company, Fort Wayne, Ind. The ironer, which is driven from the wringer socket and is electrically heated, presses everything from woolen suits to the finest silk garments. It is light in weight and easily attached to the washer. The tub of the washer is porcelain enameled inside and out in olive green. Wringer frame is of steel and rolls are of semi-soft rubber. (Illustrated on opposite page.)

The Thermador

AN ELECTRIC heater that produces a maximum of heat when and where disired has been cleverly incorporated in an occasional table by the Hoffman Specialty Company, Inc., Waterbury, Conn. The device is known as the Thermador and its design and finish blend harmoniously with the furnishings of any room. A motor-driven fan, concealed under the table's top, draws the cold air up from the floor and after passing it over and around the heating coils, throws it out in all directions through an aperture directly beneath the table top. The heated air is retained within 5 ft. above floor level.

In summer the fan can be used without heat for circulating cool air throughout the room. List prices of two standard models are $45 and $90. Thermadors may be obtained on special order to follow any designs or specifications. (Illustrated on opposite page.)

Personal Clothes Washer

THE Handi-Washer (illustrated on left-hand page) is designed especially for the baby's daily wash and for lingerie and the small pieces done at home where the bulk of the washing is sent to the laundry. Its action is as gentle as hand washing for the cleansing of delicate fabrics and woolens. It is built of aluminum with all wearing parts of hard brass, and is guaranteed to give satisfactory service for a year.

Rubber filling hose is provided with each washer, and convenient drain at the bottom of the tub makes it easy to empty. Self-adjusting wringer fastens securely on the side of the tub. Made by the Handi Appliance Corporation, 33 Chandler St., Buffalo, N. Y. Retail price, $64.50.

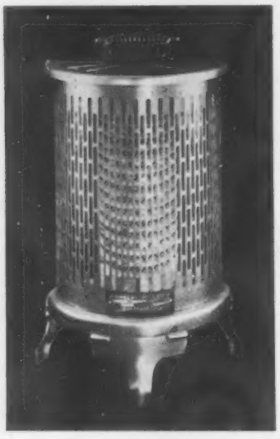
1,600-Watt Hotplate

THIS new Westinghouse double hotplate has a 1,000-watt heating unit for speedy cooking and a 600-watt unit for auxiliary service. A three-heat switch controls the 1,000-watt unit; the 600-watt unit has "off" and "on" switch only. Can be plugged into the regular convenience outlet; no special wiring is required. Retail price, $11.50.

Build Sales With New Holiday Merchandise

Centawatt Heater

A PRACTICAL and attractive appliance for quickly heating the breakfast nook, bathroom, or other small room is the 1,200-watt Centawatt heater made by Wesix Inc., 390 First St., San Francisco. The heater operates at 110 volts and may be used on any convenience outlet. Construction is of aluminum so the heater is light enough to be easily carried from place to place and will not rust or corrode. Retail price, $12.50.

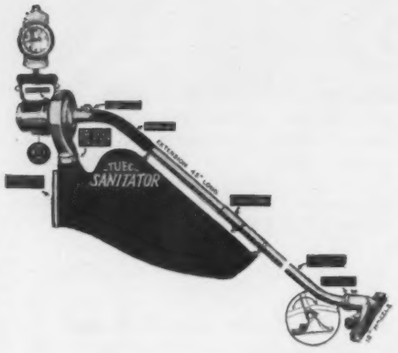


Christmas Candle Wreath

THE holiday decorative motif of this cast iron Christmas wreath finished in realistic greens and reds, and the soft, mellow glow imparted by the flame bulb of the candle, make it an attractive Christmas feature for dealers' own displays as well as for use in home decoration. Manufactured by the Markel Electric Products, Inc., 145 Seneca St., Buffalo, N. Y. List price, complete with plug attachment and packed in holly box, $2. Candle with bulb is sold separately.

Versatile Cleaner

BESIDES performing the usual cleaning tasks, the Tuec Sanitator, just announced by The United Electric Company, Canton, Ohio, can be used for moth-proofing, deodorizing, painting, as an auto cleaner, a hair dryer, clothes dryer, or cooling fan. Unlike other cleaners, the motor of the Sanitator is at the handle end, and sleeve bearing swivel nozzles permit the handle to be swung to right or left while the cleaning tool remains flat on the floor. The Sanitator weighs only 7¼ lb.—about the weight of the average electric iron.



Washer and Ironer In One

THE Conlon Corporation, 19th St. and 52nd Ave., Chicago, makes this agitator-type, circular washer with a combination ironer that fits on the drive shaft after the wringer has been removed. Both ironer and wringer can be swung into six different positions, and ironing can be done while seated. A great labor saver for the large family.

2-Slice Automatic Toaster

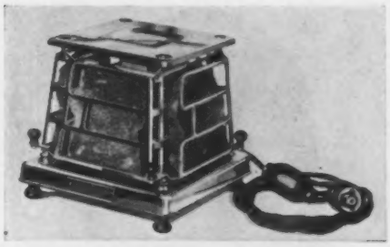
IN AN unusually compact automatic toaster made by the Trimble Manufacturing Company, 1241 Belmont Ave., Chicago, two slices of bread can be toasted to any desired degree in one simple operation. The illustration shows the toaster after the door has been automatically opened simultaneously with the automatic shutting off of the current, presenting the toast in a most convenient position. Crackers or bread of any size can be toasted in the Trimble toaster. The timing mechanism, in the base of the toaster, has a straight rotary action with no clock escapement.

Hotpoint Heater

RATED at 600 watts, this "Villa Hedlite" Hotpoint heater radiates a blanket of comfortable warmth when and where it is needed. It is finished in a pleasing gray with copper-plated steel reflector and has a cool handle and removable guard. Produced by the Edison Electric Appliance Company, Inc., 5600 West Taylor St., Chicago.

Build Sales With New Holiday Merchandise

Four-Slice Toaster



FOUR slices of bread can be toasted at once in the four-slice nickel-plated toaster manufactured by the Estate Stove Company, Hamilton, Ohio. All four pieces can be turned at once by moving one lever.

Westinghouse Coffee Sets

THE short curves and angles of an Egyptian design have been adopted for the Westinghouse coffee service shown above. The percolator has automatic heat control and is of twelve-cup capacity. Retail price of the set, complete with 20-in. oval tray, is $51; urn only, $27.50; sugar and creamer set, $11.75; tray, $11.75.

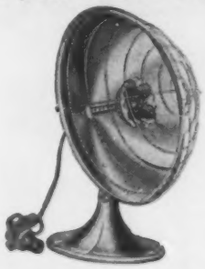
The graceful lines of the famous Wentworth design of English silverware have been followed in the set shown below, with six-cup automatic percolator. The set complete retails for $31,50; percolator only, $8.50; sugar and creamer, $6.50; and tray, $6.50.

Weatherproof Tree-Lights

A SPECIAL feature of this multiple colored light string, made by the Noma Electric Corporation, 240 Hudson St., New York, is its pin type replaceable solderless sockets, octagon shape, and made of Bakelite in colors. An extension connector designed to match the sockets is at one end, permitting the attachment of several sets to form a continuous string. Because it is weatherproof, the set can be used outdoors for decorating trees, bushes, trellises, porches, etc. Each string has 7 110-220-volt, intermedite base, 10-watt Mazda lamps in assorted colors, each lamp burning independently of the others.

Focalipse Heaters

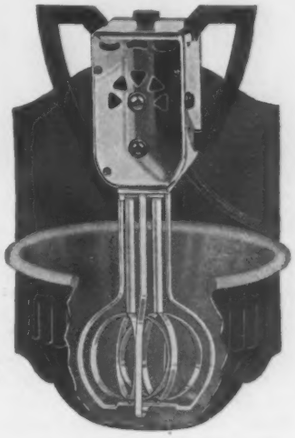
A RAY spread sufficient to cover two people seated at a distance of 6 ft. is provided by this Focalipse heater manufactured by the Anderson-Pitt Corporation, 209 Goodrich Place, Kansas City, Mo. The heater is adjustable to any angle, and the guard, made of heavy wire mounted on pressed steel ribs, will not bend or get out of shape. The element is well constructed and under ordinary circumstances should last for many years.



The standard model Focalipse heater is of buff color with coppered and lacquered reflector. De luxe models have chromium plated reflector and are finished in red, green or blue.

Food Mixer

ADJUSTABLE to changes in power and speed, the electric food mixer manufactured by the A. F. Dormeyer Manufacturing Company, 2640 Greenview Ave., Chicago, will take care of all kitchen mixes from liquids to cake batter and mashed potatoes. It stands alone in the bowl and does mixing, beating and whipping without the support of the hand. Motor, gearing and rheostat are all housed in a single case.

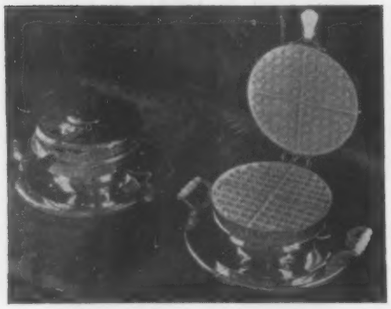


Xmas Tree Stand

A QUICK-SELLING Christmas feature is the "Usalite," an electrically lighted tree stand offered by the United States Electric Manufacturing Corporation, 222 West 14th St., New York. The stand is of heavy cast metal and holds any size tree firmly so that it cannot tip over. The tree stands in a deep-water well so that needles stay green for a long time. Extra outlets in base supply current to tree lamps, electrical toys, etc.

Build Sales With New Holiday Merchandise

Automatic and Heat-Indicating Waffle Irons



THE "Built-in Watchman," an automatic heat control device, insures the baking of perfect waffles right at the table with the Westinghouse waffle iron shown at left. Correct heat is automatically maintained. In polished chrome finish, the retail price is $20; in nickel finish, $16. Both have black handles.

A glance at the heat-indicator on the Kenmore iron (right), also made by the Westinghouse Electric & Manufacturing Company, tells the user exactly when the iron is at the right heat for baking perfect waffles. Chrome finish insures its polished surface against tarnish. Retail price, $14.50.

Percolators and Urns

NEW shapes in coffee percolators and urns have been added by the Rome Manufacturing Company, Rome, N. Y., to its line of electrical appliances. All are of solid copper, heavily nickel plated. Though the elements in these percolators use only 350 watts, percolating starts with cold water in less than two minutes. Retail prices range from $6 to $15.

Portable Washer

THE portable Whirldry washer and dryer, sold by The Whirldry Corporation, New Haven, Conn., is especially intended for the smaller and more personal wash, the baby's daily wash, dainty lingerie, etc. It washes, rinses and dries the clothes without their having to be removed from the washer. The Baby Whirldry can be used anywhere—on the kitchen drain board, a table, or in the bath tub. It is filled by a hose fastened to the faucet and the water drains off into the sink or tub through a hose attached to the washer. Retail price in the West is $67.50.

Electric Dishwasher

IN THE class of labor-saving gifts for the housewife none could be more welcome than a dishwasher that will relieve her of "her daily nightmare." The portable cabinet Walker dishwasher being marketed by the Walker Dishwasher Corporation, Syracuse, N. Y., is an attractive piece of kitchen equipment, in white or a choice of colors, which can be used with or without

plumbing connection. It washes and dries dishes, silver, glassware and pots and pans at an operating cost of less than 5 cents a week in the average home. List price, $175.

Telechron Clocks

THE electric clock will be a popular gift item this Christmas. Telechron offers this "illuminated" model with mahogany case, specially designed for bedroom use. An invisible, tiny lamp gives a soft, indirect illumination so that the time may easily be told in the dark. A switch at the back of the clock turns off the light when desired.

"Modernique" is strictly up to the latest ideas of modern art. Both models retail for $50. Made by the Warren Telechron Company, Ashland, Mass.

Toy and Travel Iron

"BABY Betsy Ross" is offered by the Central Flatiron Manufacturing Company, Johnson City, N. Y., in red, green or yellow with silk cords to match. "Betsy Ross" weighs 1 lb. and has an ironing surface 5 x 2⅝ in.

Build Sales With New Holiday Merchandise

Electric Heating Pad

A HEWITT heating pad, Model No. 46, manufactured by the Hewitt Electric & Manufacturing Company, Cambridge, Mass., gives the user a choice of six heats—two different temperatures on each of the three settings of the control switch. Non-fading dyes are used for the eiderdown covers of all Hewitt pads so that they will not fade if exposed to direct sunlight in show windows. Retail price of the six-heat model is $8; Model No. 42, two heats, $5.50.

"Hollow Waffles"

A VARIETY of waffle sandwiches and cake desserts can be made with the new Everhot "Waf-fil" baker of The Swartzbaugh Manufacturing Company, Toledo, Ohio. Any batter or cake mixture—waffles, corn bread, devil's food cake, sponge cake, etc.,—can be quickly baked with a hollow in-

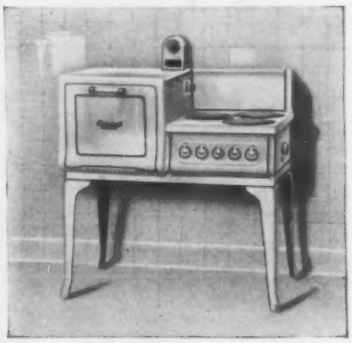
terior to be filled with creamed chicken, ice cream, preserves, or whatever the imagination conjures up. Finished in chromium plate with three green composition handles. Retail price, $16.50.

Low-Priced Washer

THIS sturdily built "Haag"—a little smaller in washing capacity than other models in this line—retails at only $99.50, yet is a durable machine

for use in the family of average size. It is of the agitator type, direct driven, and has round pressed aluminum tub and balloon-type wringer. Made by Haag Brothers Company, Peoria, Ill.

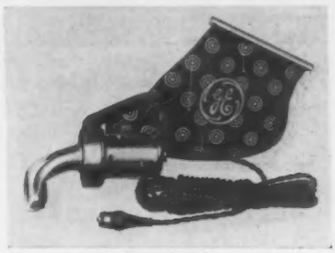
Small Domestic Range



THE Royal Queen is a new range just announced by the Standard Electric Stove Company, Toledo, Ohio, with stream lines, boltless construction, concealed hinges and load-balancing reciprocating switches. It may be had with time and temperature control, with temperature control, or non-automatic, priced retail at $205, $185 and $165, respectively. The range occupies a floor space 40 x 26 in.; height to cooking top is 33 in. The oven is aluminum lined and the burners are recessed.

Vacuum Cleaner—Hand Model

FOR the lighter cleaning jobs in the home, the General Electric Model No. 85 hand cleaner, weighing only 3¾ lb., is an ideal electrical servant. Although small and compact, it possesses unusually strong suction and will do most of the work of attachments of large cleaners. It is operated by a trigger switch conveniently located at the side of the ball-bearing motor. On the rear of the nozzle is a single brush, permanently attached. By removing the bag and reversing the cleaner it



may be used for blowing the dust out of radiators and similar inaccessible places.

In addition to home use, the hand cleaner should find a demand among furniture stores, automobile dealers and owners, service stations, railway companies, hotels, etc. The list price is $13.50.

Sandwich Toaster

A TABLE appliance of unique design is the Star-Rite sandwich toaster of The Fitzgerald Manufacturing Company, Torrington, Conn. A special

hinged construction allows for expansion so that a sandwich of any thickness may be quickly toasted. The toaster is finished in mirror nickel with Bakelite side handles. The list price is $10, and an attractive tray specially designed for the toaster may be purchased with it for $1 additional.

Build Sales With New Holiday Merchandise

Hotpoint Heating Pad

HOTPOINT's new "Reliable" heating pad is full sized (11 x 14 in.), and has standard thermostat control with three-heat switch. Its cover is of soft eiderdown. Made by the Edison Electric Appliance Company, Inc., 5600 West Taylor St., Chicago. List price, $5.95.

Automatic Washer and Ironer

COMPLETE laundry service is offered at a moderate price by the three-in-one Automatic Duco-Disc electric washer, electric wringer and automatic ironer made by the Automatic Washer Company, Newton, Iowa. A special feature of the washer is the invertible agitator which may be used in the bottom of the tub for washing a few pieces at a time with a small amount of water, or inverted and used at the top of the tub when a large washing is to be done.

The rotary ironer is interchangeable with the wringer on the wringer shaft and has an ironing surface equal to ten flat irons.

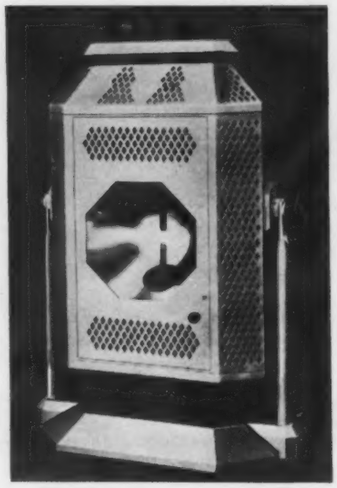
"Health Lamps"

TWO health lamps, one an ultra-violet ray lamp that produces the same invisible rays as direct sunlight, and a "Super Vim-Ray" lamp for deep therapy treatments, are offered by The Fitzgerald Manufacturing Company, Torrington, Conn.

The ultra-violet carbon-arc lamp is entirely automatic—no adjustment of the arc being necessary after connection is made, and a filter shuts out all but the beneficial rays. There is a heavy gleaming nickel reflector and the collapsible stand is adjustable to various heights. Retail price, complete with ten carbons, $50.

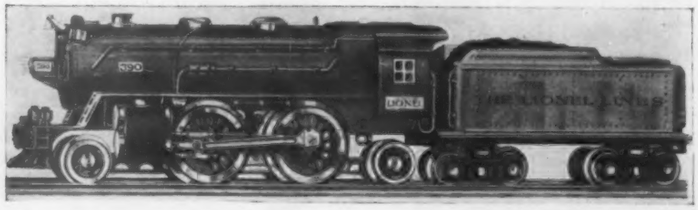
The powerful "Super Vim-Ray" lamp is for use by doctors and for the home treatment of invalids. It retails for $15.

Table Sunshine Lamp



FOR those who prefer a smaller, table-model generator of carbon arc sunshine, the National Carbon Company, Inc., Cleveland, Ohio, offers the Eveready model "M-1." Light enough to be moved to any desired location, the table model will operate on either a.c. or d.c. from any household convenience outlet. The lamp burns one pair or carbons, and while the beam may be tilted 25 deg. below or 15 deg. above horizontal, a simple mechanism maintains the arc position at the center of a chromium plated reflector. Retail price complete, including one box of ten No. 68 and one box of ten No. 610 Eveready Sunshine carbons and two pairs of special goggles, is $59.50.

Toy Electric Trains



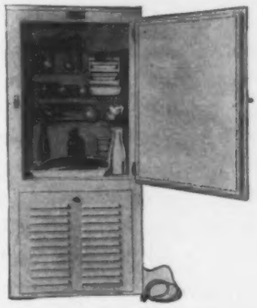
COMPLETE electric train outfits are offered by The Lionel Corporation, 15 East 26th St., New York, for the Christmas trade. "Giant of the Rails" is a new electrically driven steam-type locomotive finished in bright enamel with brass and nickel trim. It is powered by a motor that any boy can remove, take apart or convert into a powerful 3-speed reversible stationary motor. The tender has two four-wheel trucks, nickel journals, water tank and realistic load of coal. Can be sold saparately or as part of the Lionel Standard electric train outfit. A steel bridge, a power house and other accessories complete this toy railroad.

Dealers and central stations may obtain from The Lionel Corporation window cutouts and other display material for the background of moving electric train window displays.

Automatic Toaster

UNUSUALLY neat and compact in design is the Universal automatic toaster. Toast of any shade of brown desired is obtained by setting the stop lever at the position desired. The toaster is constructed of non-tarnishing chromium plate. A rack under the toast catches all stray crumbs so that there is no leakage of crumbs on the table. Manufactured by Landers, Frary & Clark, New Britain, Conn.

Regfrigeration From the Kitchen Outlet



THE Model No. 51-EU Electro-Kold (Electro-Kold Corporation, Spokane) is a compact refrigerator for smaller sized kitchens and can be connected to any existing outlet. It has white enamel interior and white lacquer exterior and occupies a floor space of 23 x 20½ in. Consumer's price, completely installed, is $185.

Junior Vacuum Cleaner

THE Eureka Junior, manufactured by the Eureka Vacuum Cleaner Company, Detroit, Mich., weighs only 4¼ lb. yet is a powerful cleaner for use on upholstered furniture, automobiles, stairways, mattresses, clothing, and for whisking away dust, ashes and litter. A handy effective hair dryer attachment is an accessory of the cleaner and can be slipped on easily in place of the bag. List price of the cleaner, $16.50; hair drying attachment, $3 extra.

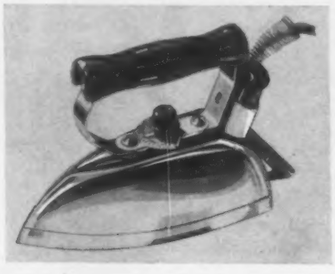
Portable Room Heater

QUICK and effective heat from an attractive bronze-finished appliance that can be attached to any baseboard outlet is provided by Westinghouse in this 1,200-watt portable room heater.

It has a rust-resisting aluminized reflector, and a counterbalanced switch turns the current off automatically in case the heater is accidentally tipped over frontward. Retail price, $12.50.

Iron With "Tuned Temperature Control"

THE turn of a small dial on this automatic, adjustable iron "tunes in" just the right temperature for ironing different kinds of fabrics. The dial is marked "silk," "wool," "cotton," "linen," and the right temperature for the fabric indicated on the dial is maintained by thermostatic control. The iron is known as the "Proctor" and is manufactured by the Proctor & Schwartz Electric Company, 6612 Euclid Ave., Cleveland, Ohio.



Full-Sized Washer for the Apartment Kitchen

CONTRARY to the usual method of selling washing machines, the "Apartment" washer manufactured by Altorfer Bros. Company, Peoria, Ill., is sold for what it will do when not being used! The washer has a full-size tub, so arranged that it may be elevated to the proper height for washing and then lowered to be put away under the sink, in the service closet or under a table. The manually operated wringer drops down over the side of the washer when not in use. Retail price, $79.50.

Duco-Finished Washer

THE robin's egg blue duco finish of the Sunny Day Klothes Kleaner, made by The Dexter Company, Fairfield, Iowa, makes it an attractive gift of the more practical sort. It has the agitator washing mechanism and the wringer can be locked in four different positions and adjusted for various thicknesses.

Electrical West

C. T. Hutchinson, *Editorial Director*
G. C. Tenney, *Managing Editor*

Avoiding Conflicting Meeting Dates

FOUR conflicting meetings of electrical men scheduled for the same city and same dates in one week. Three meetings set for the same days in two different cities for another week. That's just a sample of the start of the fall meeting period when some organizations are holding their final conventions and others getting their work under way for new administrations following the vacation period. It would appear that somewhere there is lack of co-ordination within the industry. In several of the instances cited a man's interests demanded that he be in two or three different places at the same time, obviously a physical impossibility.

It has been pointed out in these columns on many occasions that the industry's group meetings are vital and valuable; also that they represent a considerable investment. In the interests of protecting this investment it would seem that some one of the many organizations within the industry could act as a clearing house for the setting of meeting dates so that discordant congestions such as those of the middle week in September and the first week in October will not recur.

A Survey of Electrical Merchandise Distribution

DISTRIBUTION is the greatest problem facing American business today. Production costs have been cut to a minimum, but lost motion, weak links in the chain, inefficiency, competition and countless other factors are tending to increase the cost of distribution, with consequent higher prices to the consumer. So important has this problem become that a national Census of Distribution is to be conducted in connection with the forthcoming decennial census.

In this issue Electrical West presents a census of retail distribution of electrical appliances in three Western cities chosen because of the peculiar conditions in each that might influence public buying. The editors have discussed the results of this survey in detail. They are of unusual interest to every appliance manufacturer, jobber contractor-dealer, electrical retailer and central station commercial man.

There are figures on the average sales per meter, the total sales for all of the popular appliances, the percentage of sales being made by each class of retail outlet, and many other facts of utmost importance at this time. The editors commend this survey to the attention of the industry, in the hope that it will help to do a better job of appliance merchandising.

Discriminatory Rates Affect Business Conditions

SUBSIDIZING the small domestic consumer at the expense of the large industrial and commercial customer is one of the stock tricks of the municipal ownership advocate. Low rates for the former can only be justified by charging the large user the difference. In a recent report the Water Power Development Committee of the N.E.L.A. presents an analysis of conditions in two different parts of Canada. This report states:

"In Canada we have two fairly large examples of different ways of using cheap water power. For about fifteen years Ontario Province has been operating in favor of the domestic consumer at the expense of the commercial and industrial user, whereas for about five or six years Quebec Province has followed a policy of using its cheap water powers to stimulate industrial growth."

What these two widely divergent policies have done to business and industrial conditions is illuminating. From 1925 to 1927 primary electric power in Quebec increased 23.9 per cent, in Ontario 6 per cent; capital invested in electric power generation, transmission and distribution in Quebec increased 31.7 per cent, in Ontario 10.3 per cent. From the standpoint of manufacturing industries capital invested in Quebec rose 21.2 per cent, in Ontario only 10 per cent. Employees' salaries and wages in Quebec rose 20.1 per cent as against 15.6 per cent in Ontario. Taking bank debits to individual accounts as an index of business and wealth, Quebec showed an increase of 49.2 per cent and Ontario 30.3 per cent. Other figures in the report show the same decided ratios in favor of Quebec.

Here in the West where Ontario is being held up as an example every time government ownership is mentioned these figures can be made to serve a useful purpose. The industry can use them to advantage by calling them to the attention of statesmen, financiers, economists and the voting public.

Making Friends With the Housewife

"THE battle of the future is on the doorsteps of the home." "Eighty per cent of this company's bills are first received by women." "Eighty-five per cent of the purchases of electrical equipment for the home are made by women." "Ninety per cent of the complaints handled by the adjustment department come from women."

It is necessary only to add to these quotations from prominent members of the electrical industry one other—"The best asset of a public utility lies in the friendship of its customers"—in order to make out an excellent case for home service work as carried on by the public utilities today.

Some extremely interesting things are being done by the home service departments of various Pacific Coast power companies. In certain districts they are following up the sale of all major appliances. This means satisfied customers and better public relations; it means a larger monthly consumption of electricity through increased use of appliances and it means also many a prospect turned in by observant home service workers.

More than one company maintains permanent cooking schools which establish contact with every bride in the community as well as hundreds of other women each year. Home service workers give lectures in schools, talks before clubs and lessons to Girl Scouts. Through programs directed to employees, some of our Western companies are able to boast that every woman employee is a booster for electrical cooking, and they have much to do with the fact that almost 100 per cent of the married employees in certain utilities own electric ranges. The home service department is the source of much very acceptable publicity to newspapers, and in a few instances the representative of the power company has been given permanent space on the household page. This department is part of the sales force, the publicity department and the public relations staff, and is almost universally recognized as one of the best builders of good will which a power company can devise.

Such a record is extremely creditable, but it is by no means universally achieved. The astonishing thing is that there are power companies which pay no attention whatever to this phase of their relations with the public. They sell electric ranges and allow the housewife to attempt their use without any form of instruction; they handle complaints as they accumulate, rather than attempt to prevent them; and they spend large sums of money in various forms of good-will advertising designed to tell the customer what excellent service they are receiving and why they should be friends with the company. A little practical demonstration—or home demonstration—would be worth all the words in the dictionary.

Western Public Speaking Contests to Be Made National

WORD has come that another Western idea has taken a strong hold on the East and will be made national in its scope. The Public Speaking Committee of the N.E.L.A. has announced that there will be held during the forthcoming year a national public speaking contest for power company employees. For three years such contests have been an important feature of the conventions of the far Western geographic division of the N.E.L.A. Since executives have recognized the value of word-of-mouth publicity, more attention is being paid to this phase of employee development. In public speaking contests the West already has the advantage of practice. In the forthcoming national contest this may serve in good stead in bringing Westward some of the prizes.

Inspectors Profit From Association Activities

FOR a forcible demonstration of the value of association work one needed only to attend the two recent Pacific Coast meetings of municipal electrical inspectors. At one time considered outside the pale, accused of being provincial and bigoted, the inspector of former years was the ugly duckling of the industry.

If such accusations were ever true, then what a change has taken place within the past few years! The inspector of today, gaged by the standard of those who attended the two conventions, is a conscientious official with the interest of public safety at heart. Provincialism is a thing of the past, for he has found by association with his fellows that problems formerly considered purely local are identical, irrespective of geography. He is tolerant and considerate of the problems and ambitions of other branches of the industry.

Finally, he has recognized the value of standardization. If the attitude expressed at the two Western meetings is indicative of the national trend, then the industry may hope for a uniform electrical ordinance with uniform interpretations. And the inspectors' associations will be largely responsible.

Engineering Practice

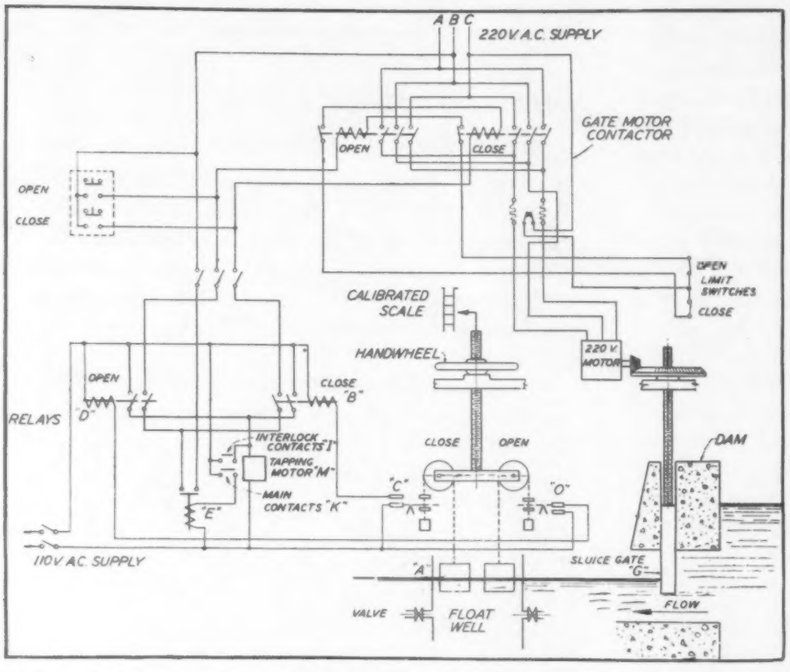
Water-Level Device Accurately Regulates Stream Flow Automatically and Within Predetermined Limits

STREAM-FLOW regulation is accomplished most effectively by means of the automatic sluice-gate control developed by engineers of the Pacific Gas and Electric Company and installed at that company's Pit River No. 4 diversion dam. The sole function of this particular dam at the present time is to provide river-flow regulation pending the future completion of Pit No. 4 power house. Through the use of this dam together with the automatic gate-control mechanism, effective peak load service is permitted from Pit No. 3 power house, and at the same time a predetermined stream flow downstream from the No. 4 dam is maintained accurately.

With a minimum flow of approximately 1,600 sec.-ft this equipment provides regulation with a maximum variation of less than 60 sec.-ft. Not only is the apparatus designed to maintain a given river flow, but also to permit the limit of river flow to be varied at will to follow the slight seasonal variation which long-standing records show to have accompanied the normal river flow.

The basis of the control is a calibrated section of the river about 140 ft. downstream from the sluice gates where a change of about 2 ft. in water level occurs for a 1,400-sec.-ft. stream variation (from 1,600 sec.-ft. to 3,000 sec.-ft.).

As indicated in the accompanying diagram a "float well" accommodates two floats, one each for operating the "open" and the "closed" control contacts. Approximate travel between the opening and closing position is ½ in. The two floats are mounted on a yoke so that they may be raised or lowered by means of a calibrated handwheel to suit the desired river flow. Manual control of this setting seems to be eminently satisfactory, for the present at least, but if remote control should be desired for the future it will be necessary only to install a small motor to drive the level-regulating handwheel and to provide a position indicator at the remote operating points.

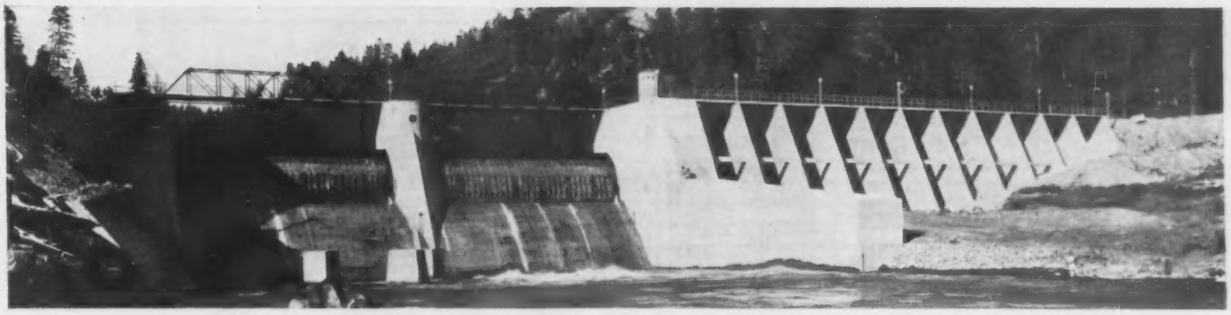


Schematic diagram of float device and related automatic equipment which regulates stream flow according to predetermined setting regardless of head behind dam, excepting, of course, spill conditions.

Under normal operating conditions both the float switches "C" and "O" are open. If the water level at "A" varies up or down due to increase or decrease, respectively, of water level back of the dam, one or the other of the float switches is operated accordingly. A rising water level closes float contacts "C," energizing relay "B" which remains with contacts closed as long as switch "C" contacts are closed. Closure of relay "B" contact energizes the "tapping" motor "M" after which the main contact "K" closes, energizing relay "E" which latter completes the circuit to the gate-motor contactor which in turn completes the circuit to the gate motor, setting it in operation.

The operating mechanism of the tapping motor consists of a Warren motor fitted with two sets of contacts and a cam having four risers. One set of contacts, "I," serves as an interlock and is wired in parallel with the contacts of relay "B" which controls the motor. These interlocked contacts are adjusted so that they will close before and open after the main contacts "K," thus preventing the motor from being stopped while the main contacts are closed. The second set of contacts is in the circuit of the gate motor. These are actuated by the previously mentioned cams which revolve at a rate of 1 r.p.m., thus giving four contact closures per minute resulting in four energizing impulses per minute to the gate motor. This arrangement provides an "inching" effect in the operation of the gate motor, resulting in close control of the gate. The duration of the inching impulses may be adjusted at will from 0 to 5 sec.

After a predetermined interval the main contacts "K" of the tapping motor open de-energizing relay "E," stopping both the tapping motor and the gate motor. After an interval of about 15 sec., if the water level at "A" has not been restored to the proper level (contacts "C" remaining closed), the main contacts "K" again are closed setting the device in operation and giving another series of impulses, closing the gate another small increment. This



Pit No. 4 dam of the Pacific Gas and Electric Company, controlling the afterbay of the 81,000-kva. Pit No. 3 hydro-electric generating plant.

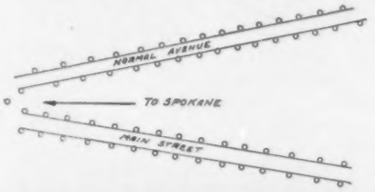
operation continues periodically until the desired water level at "A" is obtained, upon which condition contacts "C" open and the entire mechanism is set at rest.

Operation for a falling water level at "A" of course is similar to that just described, involving float contact "O" and relay "D." Any desired number of gates may be operated from this same mechanism by providing corresponding contacts on relays "D" and "B" together with the necessary gate motor circuits. This equipment has been in operation for more than a year and close observation shows that it holds a remarkably steady flow in the river.

Street Lights Serve as Airway Beacon

Street-lighting engineering and municipal forethought have been combined in Cheney, Wash., to the advantage of commercial aviation. Cheney, a community of some 1,200 inhabitants, lies along the route of a commercial airway southeast of Spokane and it so happens that two of its main thoroughfares converge to form the effect of an arrowhead pointing toward the Spokane airport.

Sixty-two ornamental cast-iron standards, each carrying 4,000-lumen lamps, have been installed along the thoroughfares as indicated in the accompanying illustrations. The installation serves the double purpose of highway illumination and as an effective airway beacon at night. The installation was designed by the Westinghouse Electric & Manufacturing Company and was donated to the town by its mayor, C. D. Martin.



Street-lighting system laid out to serve also as airway beacon.

Emergency Telephone Ringer Automatically Cut In

By H. N. KALB, Superintendent of Communication, San Joaquin Light & Power Corporation, Fresno, Calif.

Emergency ringing provided through an automatic throw-over relay has done much to alleviate the troubles of dispatchers and telephone operators of the San Joaquin Light & Power Corporation upon occasions of system trouble. When the power supply fails in the dispatchers office it stops the telephone ringing apparatus which is operated from the 110-volt lighting circuit. This is a very busy time for the dispatchers as well as the telephone switchboard operators and a resort to hand ringing is unsatisfactory.

A relay winding is connected in parallel with the field winding of the 20-cycle ringing generator which is driven by a 110-volt a.c. single-phase motor. When the power fails the motor-generator stops, the field of the 20-cycle generator dies and the armature of the relay in the field circuit drops back disconnecting the ringing set from the 20-cycle mains and connecting thereto another ringing generator operated from the main 44-volt telephone storage battery. This emergency ringing set happens to be a pole-changer with a step-up transformer on the 20-cycle side. When the a.c. power comes back the motor-generator starts, energizing its field and causing the throw-over relay to pick up, thereby disconnecting the pole-changer and re-connecting the motor-generator set to the ringing current mains. This is all taken care of automatically and relieves the dispatcher of one more worry.

The accompanying diagram shows in detail the circuit arrangement, relays, and other equipment used. The 7,270-ohm resistor should have capacity to carry 20 mili-amperes continuously without damage. The No. 2002 S.A.P. relays have copper sleeves to make them slow-releasing to permit the motor generator to stop completely before starting the pole-changer, thus avoiding the possibilities of blowing a fuse or causing other trouble. All relays and other apparatus shown are standard telephone equipment.

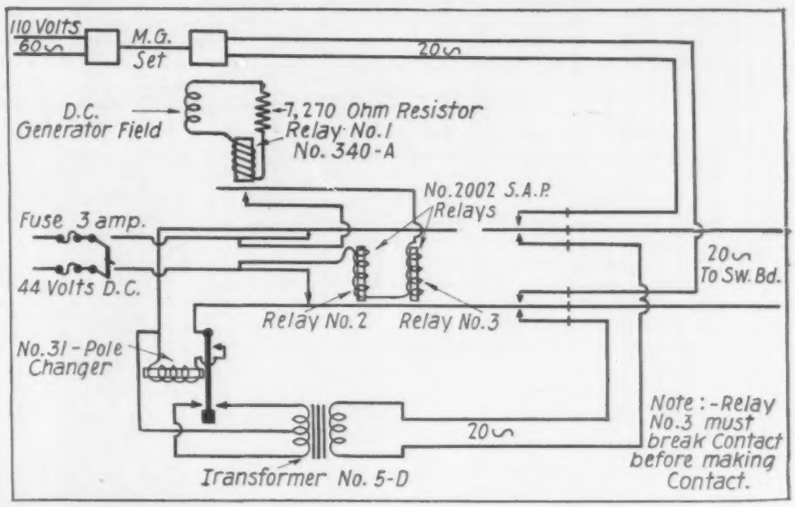
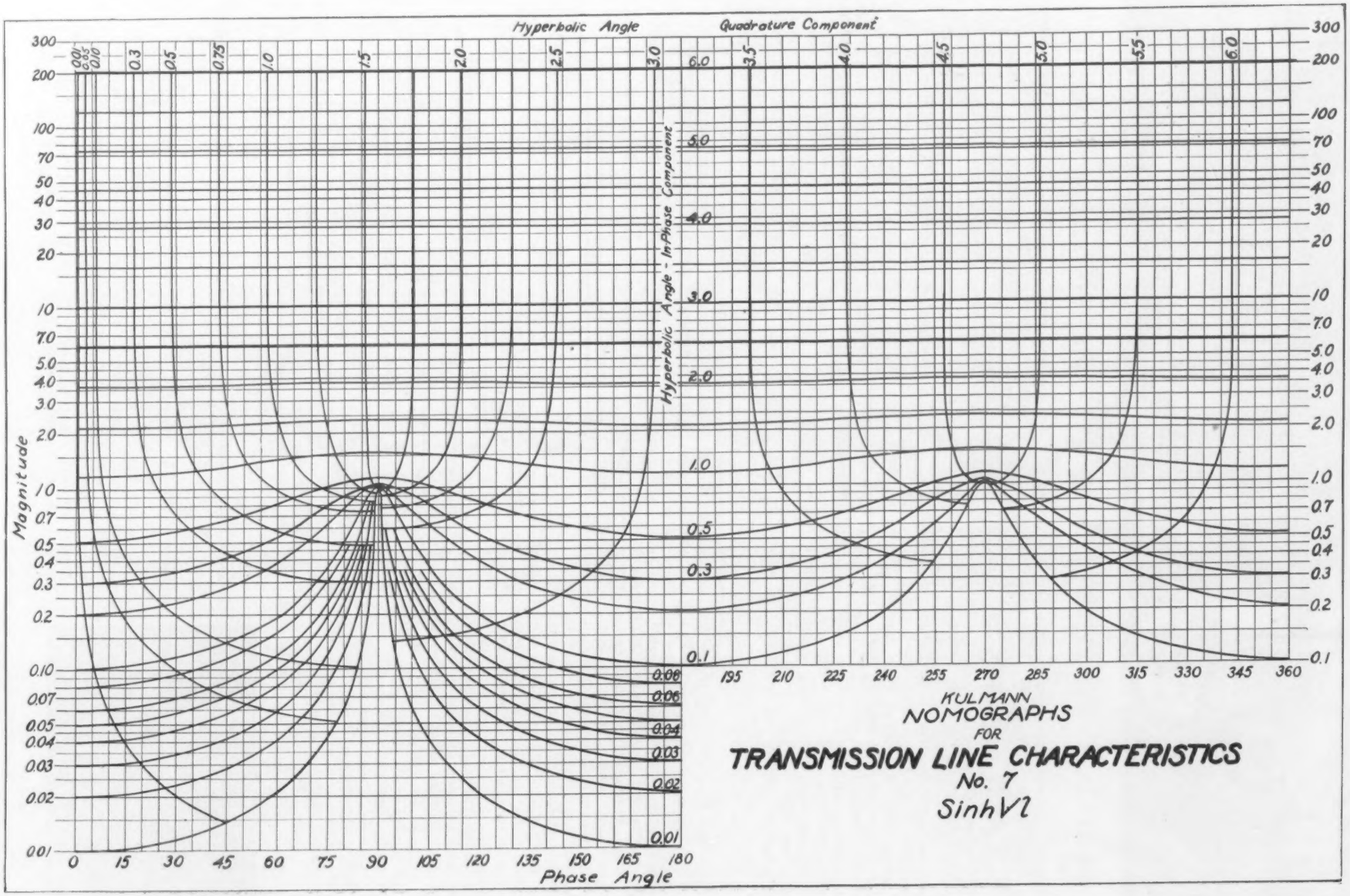


Diagram of equipment and connection for throw-over relay which automatically cuts in emergency d.c. ringer when motor-driven ringer is lost through a.c. power failure.


Hyperbolic Angle
Quadrature Component
Hyperbolic Angle - In Phase Component
Magnitude
Phase Angle
KULMANN
NOMOGRAPHS
FOR
TRANSMISSION LINE CHARACTERISTICS
No. 7
Sinh Vl

Transmission Line Nomographs—No. 7

Graphical Solution for Determination of Numerical Value of Second Half of Second Term in Voltage Characteristic Equation

By C. ALBERT KULMANN*, Pelton Water Wheel Company, San Francisco.

EVALUATION of the second term in the voltage characteristic equation may be accomplished by means of chart No. 7 of the series presented for the graphical solution of transmission line characteristics, which appears on the facing page. This nomograph is for determining the factor Sinh Vl. With the aid of a complete set of charts in this series as has been and will be published, the characteristics of a transmission line may be determined accurately and quickly, knowing the size and spacing of the conductors, the length of the line and the frequency at which it will operate.

Having determined and evaluated the hyperbolic angle (chart No. 4, Electrical West, May 1, 1929, p. 278) which was used in determining the first term of this equation, its hyperbolic sine must be determined for substitution in the second term of the equation. As before, the value to be taken for the hyperbolic angle is that representing the total line. That is, the values as determined from chart No. 4 (both real and quadrature components) are to be multiplied by the length of the line in order to evalute the two components of the angle of the total line.

* Republication rights reserved by the author.

Referring to the accompanying nomograph, the point in question representing Sinh Vl may be located by tracing the corresponding curves representing the values of the real and guadrature components of the hyperbolic angle of the total line. Of course interpolation between the drawn curves may be required in order to locate the desired point on the chart. With the point in question located as mentioned, the magnitude and phase angle of the quantity in question may be read directly by tracing the rectangular co-ordinate representing the point to the left-hand axis for magnitude and to the lower axis for phase angle. Thus the quantity Sinh Vl is determined and evaluated.

In chart No. 8 of the series this vector quantity is multiplied by the other vector quantities which appear in the second term of the voltage characteristic equation:

$$E_1 = E_0 \text{ Cosh } Vl + I_0 \sqrt{\frac{Z}{Y}} \text{ Sinh } Vl.$$

Nomograph No. 4—Vl.
Nomograph No. 5—Cosh Vl.
Nomograph No. 6—$\sqrt{\frac{Z}{Y}}$
Nomograph No. 7—Sinh Vl.

For purposes of explanation, assume a numerical example wherein the values of the components of a hyberbolic angle of the total line, as used with chart No. 5, show an in-phase component of 0.06 and a quadrature component of 1.50. The point of intersection on chart No. 7 of the curves representing these values determines the location of the desired point representing the factor Sinh Vl. The quadrature component falls directly upon one of the drawn curves, but it is necessary to interpolate between curves to locate the desired intersection point because the curve 0.06 stops before reaching the desired point on the chart.

Having located the point in question, follow horizontally across the chart to the scale at the left-hand axis where the magnitude of the quantity Sinh Vl may be read directly as 0.99. By following downward from the intersection point to the lower axis scale, the vector angle of the quantity Sinh Vl is determined directly as 89 deg. and 45 min. (The values originally assumed for the numerical example threw the point on the nomograph into one of its most difficult locations. Later on an enlarged section of this congested portion will be reproduced.

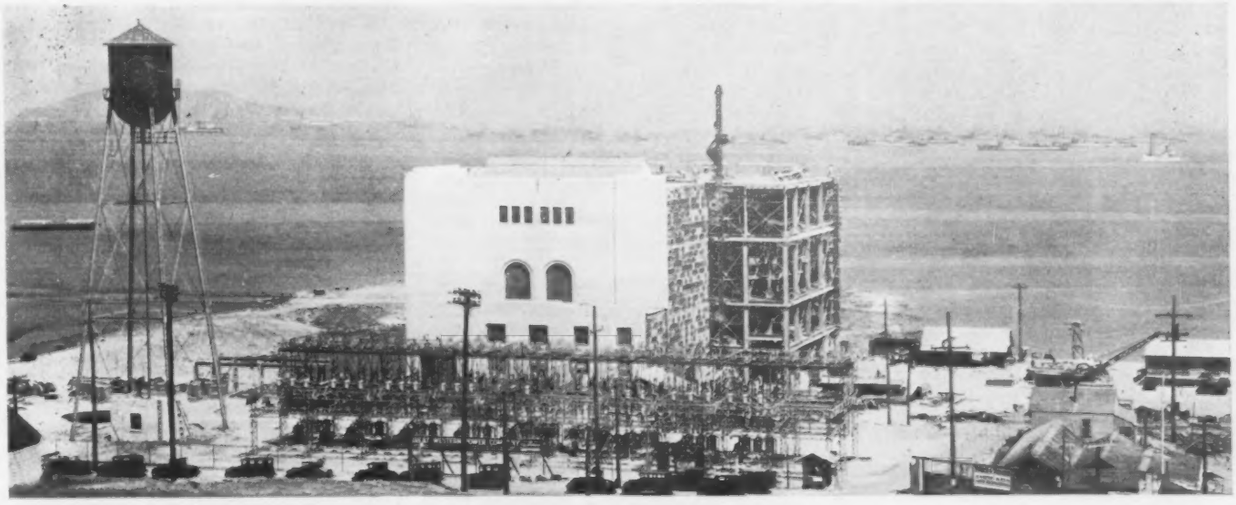
EDITOR'S NOTE: This is the seventh of a series of useful nomographs dealing particularly with transmission line characteristics and prepared by the author from mathematical and experimental data. The eighth will combine the factors of the second term in the voltage equation and will appear in an early issue of ELECTRICAL WEST.

CORRECTION NOTICE: In the discussion accompanying Nomograph No. 5 (p. 23, ELECTRICAL WEST, July 1, 1929), line nine, first paragraph, the factor given as "V or ZY" should be "V or $\sqrt{}$ZY." In the second equation the statement should be

$$E_1 = E_2\, 0.092\ \underline{|40°\ 0'} + I_2, \text{ etc.}$$

instead of as given.

Great Western Steam Plant Nears Completion



DOWN on Hunter's Point, San Francisco, the new steam-electric generating station of the Great Western Power Company of California is nearing completion under the guiding genious of Harold K. Fox, construction engineer for that company. Design and construction of this modern plant have progressed along carefully planned channels and it is to be expected that it will be placed in operation during December of this year. The first 35,000-kw. unit is to be served by two 2,225-hp. boilers arranged for the burning of either liquid or gaseous fuels and designed to permit the addition of coal handling and burning equipment. Initial construction was started in May, 1928.

Ideas for the Contractor

TO LIGHT GARDENS FOR THE JUBILEE

By N. H. GRAVES
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LIGHT'S Golden Jubilee should provide a golden opportunity for the development of a much neglected field —garden lighting. While many such installations are of a temporary nature, the beauty of the effects produced are such that it should not be hard to sell a permanent installation later. This is a field to be developed by the wide-awake electrical contractor although its effects are beneficial to all branches of the industry. To the home owner they are a source of enjoyment hitherto undiscovered. Consider these facts.

Every home owner, whether his is a three-room cottage or an estate of many acres, has a garden of some sort. How many can really enjoy their gardens to the fullest? Few are home during the day. The average man works five and one-half days each week. Saturday afternoons he may work around home, and on Sunday he goes to church or plays golf.

When he reaches home, then, it is dark, at least too dark to enjoy the garden. Only the man who has his garden illuminated can enjoy it beyond the setting of the sun. Moreover, such a man has an added advantage, for if visitors arrive they may be shown the garden too, or if the evening is warm, may be entertained in it.

After presenting the foregoing reasons it should not be difficult to sell permanent jobs of garden lighting. The same reasons hold good for the temporary installation, plus the festival reason of an occasion such as the Golden Jubilee of Light, a garden party or an outdoor wedding, which will bring into action immediately the long dormant desire for just this sort of lighting.

Now as to lighting the garden. It may as well be admitted at once that there is no formula, no secret method. Every garden is an individual case and must be treated as such. In the following paragraphs will be set forth a few of the problems which will be encountered and it will be shown how they have been met successfully.

Before proceeding let me say that no garden can be considered complete without a pool, fountain, waterfall or stream running through it, for running water, properly illuminated, is the touch that gives life to the lighted garden.

Three methods are to be recommended for lighting pools, namely, floodlighting from above, floodlighting from the outer rim, or lighting from below the water line. To floodlight from above it is necessary to have a tree nearby in which to conceal the lighting unit high up in the branches. The second method, that of lighting from the rim of the pool, is sometimes preferable. It takes, however, an inverted cove by means of which the lamps may be concealed and the light directed down into the water. If colors are used the effect is heightened for the reflected light is re-reflected by the water.

The submarine method of lighting a pool presents many difficulties and in general is not recommended. These difficulties include that of relamping, keeping the enclosing units clean, and the high absorption of light by the water. For the wattage used this method gives the least results.

Fountains can be lighted by any of the methods described for pools. Where the lighting units are placed around the edge of the fountain or in the bottom of it flasher buttons may be used on the individual lamps to give movement to the color. The best effect for lighting is produced on the fountain which sprays water toward the center of the pool from a ring at the rim. This form of spray gives more surface to reflect light and hence is more spectacular in its effect.

Waterfalls are built into rock gardens, as a rule. The results attainable with these are beautiful. Here again it is a case of having more exposed surface with which to reflect the light. Naturally the best time to install lighting for a waterfall is during the construction of it.

In any case a flood or spot light may be placed at a distance and the aperture so masked that a beam of light will be confined to the waterfall alone. In this way contrast with surrounding garden lighting may be achieved, especially if color is used. Lighting coves can also be concealed in such a way as to be unnoticeable and yet shine on the water. Care should be exercised to make sure that relamping may be done.

One method of lighting a waterfall is to place a number of different colored lights in a niche behind the waterfall. using 60-watt natural colored lamps. With flasher buttons even better results may be obtained than with fountains. Broken pieces of mirror imbedded in the stream or the rock background of the waterfall or in the basin of a pool or a fountain reflect the light and aid the natural reflection of the water.

Trees in a garden are a great aid to lighting. It is possible to conceal units in them with which to flood the whole garden or to spot some particular object or area. Lanterns may be hung from the trees. The use of stringers of the new small 10-watt intermediate base colored lamps through the branches makes an unusually pleasing sight. A flood of straw colored light on trees makes an excellent background.

Bushes and shrubbery in a garden must be handled with care. Flooding them from concealed light sources placed beneath them is usually very effective. For temporary installations the lower portions of the shrubs may even be sprayed with whitewash to provide greater reflection value and enhance the effect, though naturally in a parmanent installation this is not recommended.

When a general effect is desired, floodlighting the entire garden from the top of buildings or by placing the units in the trees is usually good practice. A moonlight effect can be produced by using filter screens over the units of light blue. Some straw colored and one or two dark red. Another most pleasing effect is produced by using moonlight blue floodlights and strings of lanterns with small dark amber lamps in them.

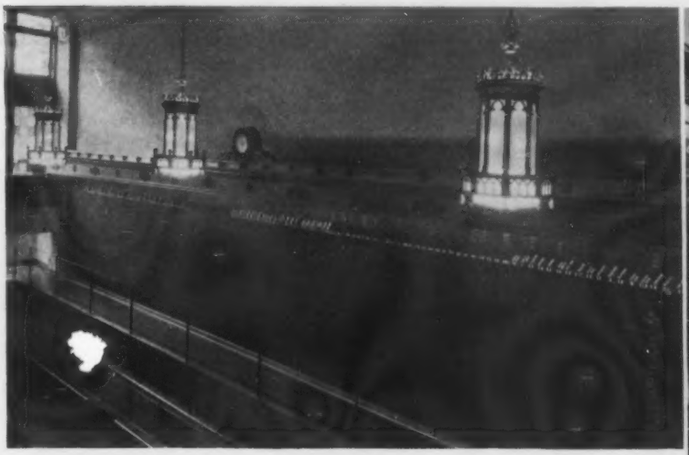
Pergolas, trellises and arbors are ideal for lighting. The use of various types of lanterns in them, particularly those which suit the type of garden in which they are used, make these arbors a source of enduring enjoyment after dark.

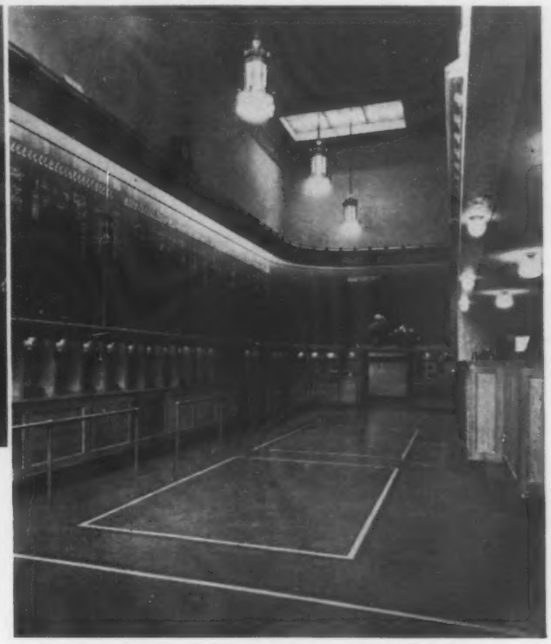
Figures and jardiniers in niches must also be treated in accordance with their natural surroundings, sometimes being lighted individually though very often the general lighting will be sufficient for them also.

In doing garden lighting the cost very often determines the initial "plunge." Rather than trying to sell permanent lighting fixtures for the

temporary job it is often better to provide as much of an effect as possible with makeshift equipment, such as reflectors cut out of tin coffee cans, etc. If only money for the lighting of one object is available, light a pool or a particular corner which will appear to good advantage.

Such temporary and makeshift equipment is not good looking enough in the daytime to be wanted permanently. Moreover, it will not stand the weather. But the desire has been created and it is never difficult to follow up such a makeshift installation with a permanent one using standard equipment properly installed. Herein lies the market for the contractor.





Above, left: A close-up view of three of the special fixtures. *Right*: Looking towards the members' entrance. In the cove above the board are 80 100-watt inside frost lamps which light the top of the board. The center fixtures light the remainder of the room. The ball fixtures under the balcony are 6-in. blue layer globes numbered to designate trading centers.

ILLUMINATING VANCOUVER'S EXCHANGE

STOCK-EXCHANGE boards always present a problem in lighting, but those in the new Vancouver, B. C., stock exchange in the recently completed exchange building in that city presented an unusual case to Farr, Robinson & Bird, Ltd., fixture dealers of that city. The pit of this exchange is at the basement level, with a balcony entrance from the street. This complicates things for the fixture man, for if ceiling units are used to light the pit they must be of such a nature as to light the floor and the board, and yet must not be in the line of vision of the customer.

In this case the room is 64 ft. long, 25 ft. wide, with customers' gallery 13 ft. from the main floor, and a total ceiling height of 30 ft. The conditions presented to the fixture man in this instance were:

1. Design of the fixture to be in the form of a Gothic lantern to fit in with the detail of the building ornament and the general design of the exterior.

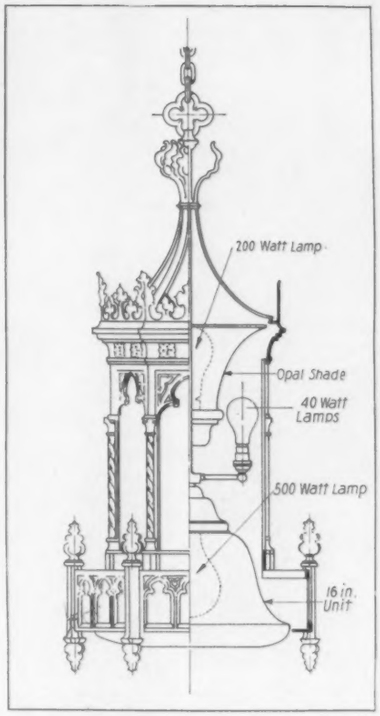
2. The lantern not to be within the line of vision of the customers' gallery.

3. The illumination on the main floor below to be not less than 10 foot-candles.

4. The ceiling to be illuminated to 8 foot-candles.

5. The lateral light to be of a soft amber color to blend in with the cathedral glass used for daylight from the south windows.

These conditions have been met in a satisfactory manner by the construction of four special lanterns in Gothic style as shown in the accompanying illustrations. These were designed by the architects, Townley and Matheson, in collaboration with the fixture contractors.



Cut-away view of special fixture showing placing of units and lamps.

Below the quotation board on the main-floor level are 54 cubicles, each equipped with a private telephone for members of the exchange. In addition to this there are on the opposite wall four public telephones and three telephone booths. These cubicles were illuminated by individually controlled lamps concealed in a small cove.

The building, owned by Miller-Court & Company, houses another exchange belonging to that company in addition to the Vancouver Stock Exchange, which leases space. In this portion of the building the electrical contractor, C. C. Carter, of Vancouver, provided eight bracket coves in which are placed 500-watt reflectors directed at an ornamented ceiling which was desired without fixtures. This provides four watts per square foot of illumination and is capable of being lamped with 1,000-watt lamps to increase intensities.

The building electrical system is particularly complete, the electrical contractor having installed transformer vault, switchboards and circuit panels at each floor, which provide for individual metering to tenants.

BRAND NEW IDEA

MOTOR

A Department for and by Motor Specialists

Front Floor Space Too Valuable to Use as Display or Storage of Second-Hand Motors When It Can Earn Dividends Selling the Firm's Services.

UNFORTUNATELY many industrial contractors fill their show-windows and sales floors with dusty motors and second-hand equipment. They still serve small cash customers through the stock-room window.

Not so the Pacific Electric Motor Company of Oakland. A revolution has taken place. It all came about through the need for more office space when Frank Boyd, formerly of the General Electric Company, joined the firm. This company then decided that a neat, attractive display of its line of motors and accessories would not only stimulate cash sales but would be of inestimable value to its salesmen. The front of the store was remodeled, therefore, and a mezzanine was built to provide space for the new offices.

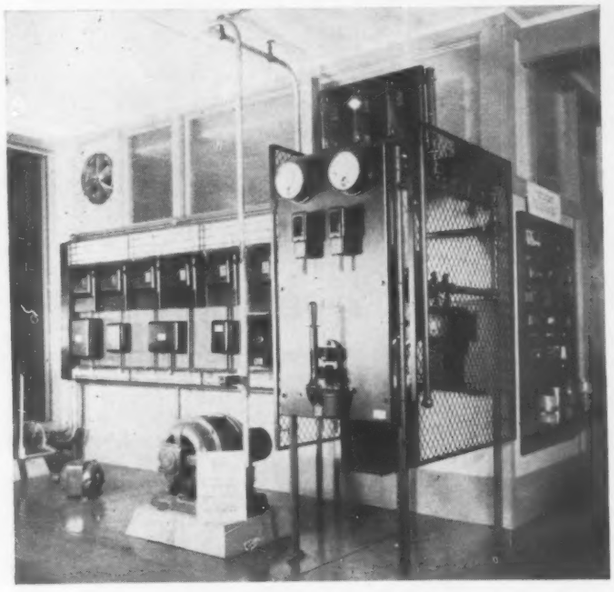
The major portion of the lower floor was set aside for a display room. Both the new display room and the offices were redecorated and well chosen types of lighting units were installed, so that even these might become part of the display.

Although this company is essentially a motor concern, a considerable volume of its income is received from accessories, portable electrical tools, wiring, heating, and lighting jobs. Thus, when the display room was planned, Walter D. Vance and F. E. Boyd, the executives of the company, laid it out to cover all phases of the business, so that manufacturers and other interested prospects could not only see the products to advantage, but might also see an actual demonstration of proper lighting, motor control in operation, etc. The prime idea was to render a real service to prospects, to aid them in arriving at a balanced decision in the purchase of electrical equipment.

A model installation of motors and controls has been built into a corner front window. This includes an oil circuit breaker panel with disconnects, and bus work similar to that which might handle a large factory load. From this panel the leads go into a raceway and are tapped off to each motor circuit through standard externally operated knife switches and magnetic control boxes. The raceway, knife switches and control boxes are all mounted on a sheet-metal baseboard forming a self supporting unit. The raceway is cut open and glass covered to show the neat bus bar work leading from the oil switch to the knife switches.

The motors are all controlled by push buttons located at the motors. One of the motors is of the variable-speed type controlled by a pedestal handle, while another is equipped with a push-button reversing switch. By thus showing the motors actually running, easily controlled by push buttons, and properly protected from overload, it is much easier to explain to a customer how a new job is going to look and perform.

Where once were second-hand motors now are show cases and tables showing new lines handled, office heaters, portable tools, pulleys, parts and accessories.



Motors which operate demonstrate push button control, conduits are cut open to show wiring, and the switchboard has glass-fronted gutters which show the neat bus bar and circuit connections.

One corner of the display is devoted to industrial lighting. A typical selection of metal and glass reflectors has been mounted from the ceiling with individual control. The same size lamps have been put in each fixture so that a relative comparison may be made of the different units and their relative diffusion and distribution of light. A voltmeter and rheostat have been wired in series with the lamps so that the effect of variable voltage can be shown.

But the real lighting exhibit is in the offices and shop. Each of the offices has been equipped with a different type of unit adapted to the lighting requirements. The shop and warehouse have also been lighted in the most approved and modern style of factory lighting. To attract attention to the lighted area a neat card has been put in each room telling the total area, total watts, and watts per square foot.

A small heat treating furnace has been set up with thermostat control to demonstrate the possibilities of electric heat in factory processes. Also there are several types of air heaters for the factory office.

Instead of the usual stock-room window a counter at the back of the room makes it convenient to serve the public and the steel shelves behind the counter are kept stocked with the small wiring items most frequently called for. The

FORUM

in the Interest of a Better Motor Trade

The table in the foreground has a motor rewind job in its various stages to demonstrate the quality of work done. At the rear may be seen the counter from which lamp and cord and accessory sales are made.

Pacific States Electric Company has made up two interesting panel exhibits of wiring devices and insulating materials and these panels are a help in the selection of wiring supplies.

Motors and lighting equipment and their proper installations, as well as complete shop facilities for motor overhauling and trouble-call, constitute the main bulk of the business of the company. Nevertheless, it still finds that there are a number of side lines which are of profit and service to its customers. A complete assortment of electric drills, saws, hammers, and grinders is displayed in a neat cabinet. Such equipment is used in every factory and shop and it is often possible to sell a customer simply by interesting him in tools used on the job. Other items along this same line are soldering irons, glue pots and melting pots, and strip heaters for small heating processes. Smaller parts and articles are placed on the tables where they can be picked up and inspected.

While such a display room sounds more like a retail store than an electrical contracting house, the idea has proved very successful. By having apparatus actually installed and usable, and parts and small articles on the tables where the customer can see them and handle them, it is much easier for the salesman to explain and sell his merchandise. Also, the fine lighting installation in the offices and shop seldom fail to impress a prospect with the fact that such installations are practicable, and "seeing is believing."

In short, this display corresponds to a power company's display of household appliances in its own stores, except that this is in the industrial field.

While the display room and the major installation will be permanent, capacity and switchboard facilities are such that new types of apparatus may be connected as they are added to the company's stock. The policy will be to stress diversification of the company's products and activities.

This business is divided into three main departments: Shop (repairs), wiring, and retail sales. The volume in the shop and wiring departments is apt to fluctuate somewhat, but the company's records show a steady and stable income from the sales department, particularly since the installation of the display room.

This display room will not only be a salesroom for the Pacific Electric Motor Company, but a permanent exhibit of modern industrial equipment where the industrial public will be welcomed for inspection and discussion of its problems.

Lighting units can be demonstrated in actual use in this corner. A speed-of-vision disk shows the effect of light in industry. A rheostat demonstrates the effect of low voltage or improper lamps.

The power companies and salesmen for electrical manufacturers have been invited to make use of the company's display. Night showings are being made available by appointment.

"Leading manufacturers and engineers recognize that this step forward reflects credit upon the entire electrical industry," says Walter Vance. "We hope it sets a new pace in industrial selling, and that others will emulate the Pacific Electric Motor Company in the general interest of raising the level of electrical contracting."

RECOMMENDED MOTOR POLICY

Detailed Changes in Classification, Discounts and Franchise Provisions of Motor Policies Recommended by State Motor Section, California Electragists.

EDITOR'S NOTE: *The following is the full text of the report prepared by the Motor Section, California Electragists, at its recent state meeting in San Francisco, to be presented at the National Motor Section meeting at the A.E.I. convention, Swampscott, Mass., and to the policy committees of the industrial divisions of the National Electrical Manufacturers Association.* *See page 215.*

TWO years after their first statewide motor meeting at Fresno, the motor specialists of California have met again to discuss frankly ways and means to improve motor distribution to the best interests of both manufacturer and dealer.

During these two years, due to a recalling of the old and the issuance of new motor distribution policies by manufacturers, commendable improvement has been noted in the mutual relationships of manufacturers and dealers, especially in this territory. The new policies, reclassifying accounts entitled to discount, on the whole have improved the situation materially.

Believing that the fundamental principles enunciated in their former report are still a paramount issue and that they may more nearly be accomplished the Motor Sections of both Northern and Southern Chapters, California Electragists, restate those principles and in this report make recommendations which they believe will continue to improve motor distribution to the benefit of both manufacturer and dealer.

The fundamental principles upon which the motor industry or any other industry may survive, are stated in the former report and repeated here as follows:

"Competency to serve the motor manufacturers at the highest efficiency and the extension of the motor market at the most consistent pace is dependent upon the effort put forth by the dealer. His interest in the development of the market is essential. No less essential is the careful selecting of the motor outlet by the manufacturer. In both cases there rests upon the manufacturers a responsibility which cannot be ignored if the market is to be stabilized and the proper energy devoted to the extension of the market.

"Unless there exists the incentive of a reasonable profit to excite this interest and to stimulate this effort, the impedance which a demoralized market condition inevitably sets up will react, as it has been reacting, to the detriment of the motor manufacturers' interests."

Upon these principles, in which the interests of both manufacturer and dealer are inseparably woven, these further recommendations of the State Motor Section have been predicated and are hereby submitted. These recommendations come under four headings:

I

MANUFACTURERS CAN MORE PROFITABLY SERVE—

(a) All Class A Business Through Established Dealers.

The motor dealer, properly set up to take care of sales engineering, to supply parts and make repairs, and render continuous service, because of additional business possibilities in connection with each installation, can cover this class of trade more economically than the manufacturer whose sales expense for this class of trade is out of all proportion to the results obtained. Strict analysis will reveal that the manufacturer set up for large operations who scatters his efforts over a large number of small accounts, will run up the overhead costs of such business to exceed all reasonable proportion to other costs. Cost studies recently made prove the economic value of manufacturers serving fewer but better outlets.

From the motor dealer standpoint this Class A business is absolutely essential for the bulk of his business and unless he can be given the right to sell it in its entirety he will not be able to maintain the staff and equipment necessary properly to serve the products of the manufacturer he represents. Thus in both cases the manufacturer can best build up and strengthen his market by

(1) Putting all Class A business through an established accredited dealer.

(2) Make it profitable for that dealer to service and repair equipment bearing the manufacturer's nameplate and implied guarantees.

(b) More of the Class B Business Through Dealers.

It is recognized that some types of Class B users cannot be served properly by the motor specialist. Yet it has been proved by experience also that much of the Class B business so listed at present can be and is being served to better advantage by the established and qualified motor specialist than direct by the manufacturer.

It is desirable both from the standpoint of manufacturer and dealer that still further restriction of Class B users be made or reclassified under Class A. The same economic reasons which make sales expense to manufacturers disproportionately high in handling direct a number of small Class A accounts renders the serving of large numbers of small Class B accounts likewise unprofitable. By increasing the motor specialists' volume and enabling him to build up his sales in wiring materials and supplementary equipment this class of business can be served more profitably for both the dealer and the manufacturer he represents.

II

For a More Healthy Motor Distribution a Revision of Discounts on Various Classes of Equipment Is Imperative

Several basic changes in industry have brought about a condition which can only be met by a general upward revision of discounts on motors and equipment. These changes are:

(1) The increased use of direct-driven machinery by industries. This is fundamentally a forward step and it is not the intent nor implication of the Motor Section to desire restriction of this progressive tendency in any way. Nevertheless the increased volume of machinery used by industrials which comes self-equipped with motor and control does restrict the market for new motors materially. Yet because these integral motors do require service and repair facilities, parts and personnel to render this service must be maintained economically. It is imperative that the margin on the smaller volume of motors now sold be larger in order to take care of necessary "readiness-to-serve" overhead.

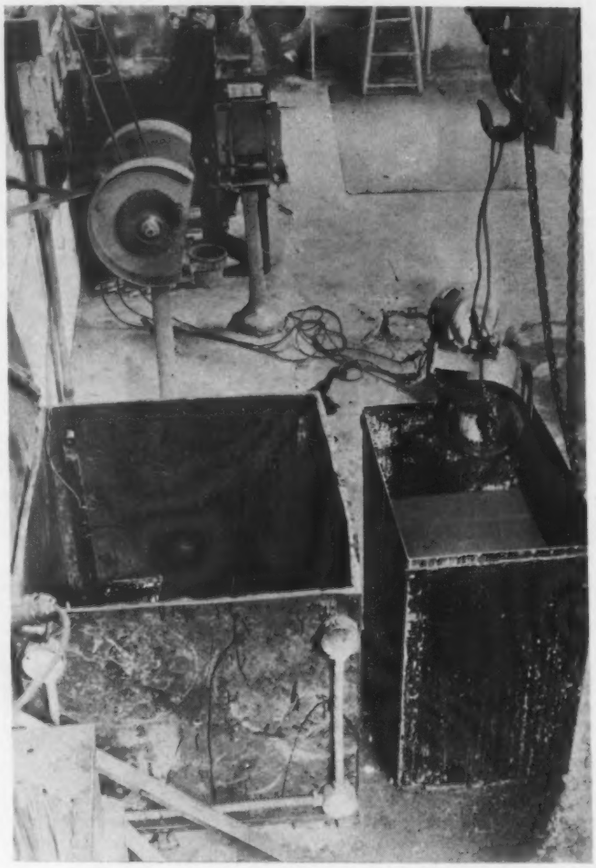
In the recommended scale of discounts which follows is represented the result of careful deliberation and analysis of selling costs by the Motor Section. These discounts have not been set arbitrarily nor without due thought. They represent the average opinion and the unanimous recommendation of this section to manufacturers.

(1) Fractional Horsepower Motors.

This class of business costs perhaps more to handle per unit of sale, and brings less return than any other for the following reasons:

(a) The dealer must carry a larger representative stock on hand ready for sale and delivery than is necessary with larger motors for which he can depend upon his jobber or manufacturer for stock. This means a large investment lying idle.

(b) There is no greater time waster than the customer for a small motor who asks numerous questions, requires a great deal of information and data on pulley sizes, etc., and who buys only a single motor for experimental, home shop, washing machine or other domestic purposes.



Small Oven Does Big Work

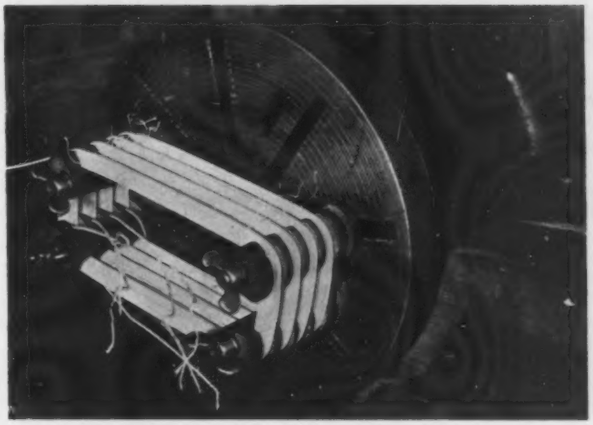
A BAKE oven for the drying of coils in motor repair work need not be a large, cumbersome affair. Motors up to 100 hp. are handled very easily in this small metal bake oven, used by the California Electric Works, San Diego. It is simply a metal can containing six strip heaters mounted as shown in the illustration. The varnish dipping tank will be noted immediately in front of the oven, making for quicker handling of these two consecutive processes in motor repair.

(c) Manufacturers themselves admit it unprofitable business and their margin is greater than the present 17 per cent dealer discount. On the margin of $1.82 on a $10.75 motor the dealer cannot but lose money on this class of trade.

Therefore, the Motor Section recommends for fractional horsepower motors a discount of 25 per cent with perhaps a return of some form of quantity purchase discount also.

(2) Analysis of sales cost of handling other sizes of motors leads to the following recommended approximate scale of discounts on motors and control:

From 1 to 15 hp.—25 per cent.
From 20 to 50 hp.—20 per cent.
From 60 to 200 hp.—17 per cent.
All over 200 hp.—10 per cent.

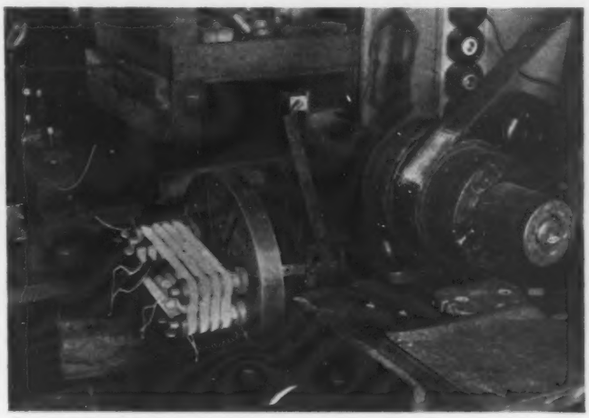


Adjustable Gang Winding Form

GANG winding of coils for motor repair found another application in the special device made by "Mac The Motor Man," otherwise known as Mr. MacIntire, 120 North Division St., Spokane. Lugs have been fashioned of hardwood to accommodate five coils. These lugs are drilled off center so as to form a concentric arrangement which when turned allows the finished coils to be slipped off. A thumb screw keeps the lug tightly in place when set for winding. These lugs are fastened to a face plate having adjustable slots each of which is marked at intervals for various types of coils. The marking was done with an ordinary numbering punch set.

This face plate winding arrangement has been mounted ingeniously to a reduction gear taken from an automobile truck winch. The plate has been keyed to the shaft of the reduction gear. Three wooden pulleys bolted together, each of different size, allow three different speeds for the winding apparatus driven by a ¼-hp. 2,700-r.p.m. motor. A foot-control button starts and stops the apparatus.

Spools of magnet wire are kept in a tension rack at one side of this apparatus. The wire is drawn through a braking device fashioned of pieces of fiber which may be clamped together to required tension.



(3) On synchronous and arc welding equipment, transformers, switchboards, meters, instruments and accessories, which business is being developed to increasing extent by the motor specialist, a discount of 10 per cent is only reasonable and economically justified. At the present time the dealer's customer can purchase these as cheaply or nearly so as the dealer himself, allowing the dealer practically no margin for handling and stocking. This condition in no way is constructive to a healthy motor distribution situation.

(4) On repair parts a policy which is consistent with the policies on motors is desirable from all standpoints. Likewise because of the multitude of small items which must be carried in a complete stock of repair parts for motors and control apparatus and the fact that 50 per cent of sales of these parts are for amounts under $3, the present margins of around 32 per cent are not sufficient.

The former margins of from 43 to 57 per cent of selling price were more nearly in line with the expense of handling these items and maintaining service for both Class A and Class B trade.

Neither is the requirement that $500 of such materials be bought to enjoy the full discount a reasonable one. Experience of manufacturers who have handled repair part accounts direct cannot but bear out these conclusions.

III

Manufacturers' Repair Shops Should Be Conducted as Service Shops Limited to the Repair of Their Own Equipment and Refraining From General Solicitation of Repair Business.

Motor manufacturers necessarily are obliged to maintain service shops to render service and repairs on their products where defective materials or workmanship cause breakdowns. This service, however, should be limited to their own products and the cost of this service should be an overhead expense.

The manufacturer's policy of maintaining combination service and repair shops and striving, by actively competing for repair work, to make this department profitable enough to cover the overhead cost of legitimate service is detrimental to the interests of the motor specialists and should be discontinued.

Some manufacturers have in effect a policy which offers services of their engineers to lay out wiring installations and then furnish superintendents or foremen to supervise the actual installation. This practice is entirely unwarranted and is depriving the manufacturer's enfranchised dealer of a considerable amount of business which is rightfully his. We recommend that this policy be revoked and that any such service the manufacturer desires to render be offered through a qualified motor specialist.

IV

Class D Agreements Should Be Offered Only to Firms Which Can Completely Qualify to Render the Manufacturer the Service in Sales, Market Development, Repairs and Service Which Will Make for a Full Development of the Motor Industry

Realizing that the adequate handling of Class A and much Class B business for the best interests of the manufacturer depend so much upon the character, skill and financial stability of the motor outlet, the Motor Section restates its position with regard to the situation.

(a) Scientific classification of motor dealers entitled to Class D agreements should be made by manufacturers based upon the following requirements:

(1) Character
(2) Credit responsibility
(3) Capacity to engineer, sell, install and service.

In this connection the definition of a motor specialist as distinguished from an ordinary contractor-dealer is given here:

"A motor specialist is an individual, firm or corporation regularly in the business of selling, repairing and installing motors and properly equipped and qualified to sell, service and install motor apparatus and accessories."

Lest it be imagined that the Motor Section of the California Electragists has no other purpose than that of contact with and analysis of problems mutually affecting manufacturer and motor specialist, let it be said that at regular meetings local problems of technique, management, salesmanship and internal policy are the chief activities of the sections.

In these larger problems of national policy, however, affecting as they do every individual motor dealer, this means of expressing our well digested and thoroughly considered recommendations is used to bring to the attention of manufacturers matters which affect the economic development of their business. These recommendations, therefore, deserve no less serious consideration than that given them when they were conceived.

What Various *Reflectors* Are Designed to Do

Continuing the Study of Designing Industrial Illumination Jobs That Can Be Sold on a Basis of What They Will Do

By J. R. WILSON, Quality Electric Works, Los Angeles.

WHILE it is true that all manufacturers of lighting equipment issue catalogs and descriptive literature regarding the uses and characteristics of their particular equipment, the summary of types of industrial lighting reflectors which follows will serve to provide in a brief form the salient features and uses of these prevailing types. From this the busy contractor or estimator may more quickly come to a decision as to the type suitable for a certain class of job and by investigation of the particular equipment required, as furnished by the manufacturers, design the proper lighting layout.

These more or less standard types of lighting units are as follows:

The R.L.M. Standard Dome

This type of reflector is used quite generally in all lines of manufacture, and gives very good results in most cases. With this reflector a great deal of light is directed at the higher angles, which makes them especially suitable where the work to be performed lies in a vertical plane.

The reflector is of such depth as to provide ample protection from the glare of the lamp filament, if the units are hung at such height as to be out of the line of vision. However, it is best practice to use the bowl-enameled lamps to preclude all possibility of eye-strain or injury.

In using these reflectors the distance apart should be approximately one and two-thirds times the mounting height. In some places, such as warehouses, uniform lighting throughout is not required. In these cases the spacing ratio can be increased to two, or two and one-half times the mounting height.

The Glassteel Diffuser

This reflector is designed for high-wattage Mazda C lamps and consists of an extra large metal dome reflector, with a lamp enclosing globe of light density diffusing glass. This method of design is very efficient in providing a large amount of diffused light over a large area per unit.

The tops of these units are sometimes perforated and a considerable amount of "spill light" escapes to the ceiling, thus helping to provide general illumination throughout the room. The metal reflector is usually of white porcelain enamel on the inside and outside and presents a very pleasing appearance in any installation. This unit is also very easy to keep clean.

This type of reflector is designed for installations where the highest type of illumination is desired, where high intensities are essential, where direct or reflected glare must be eliminated, where diffusion of light is required for distribution, and where work on vertical surfaces predominates. One outstanding feature of this unit is the fact that Mazda C daylight lamps may be used with but very little change in color of the light produced. For the highest efficiency clear lamps should be used. The units should be spaced not more than one and one-half times the mounting height above the work for uniform illumination.

Standard Bowl Reflectors

With this type of reflector the lamp filament is shielded at a lower angle than provided by the R.L.M. dome. For this reason, it is sometimes preferable for systems of general overhead lighting. Where the reflectors must be mounted above crane runways or at other high points this type of reflector in many cases provides the ideal unit.

The distribution of light is rather strongly downward and these reflectors are therefore suitable for local lighting. These units should be spaced approximately one and two-thirds times the mounting height above the work, for either general overhead or group lighting. For local lighting they are placed, of course, at points adjacent to the work.

Glass Top Reflectors

Some reflector manufacturers have developed a type known as "glass top" reflectors. These are a development of the regular dome type, with a portion of the top cut away. These openings are covered with light density diffusing glass which permits a portion of the light to travel upward, thus providing a means of illuminating the ceiling and top walls.

Such light also serves to light up pulleys, line shafting and other moving parts which may be above the reflector mounting height. This type of reflector lends itself to the same types of installations and the same spacing factors as does the standard R.L.M. dome type.

Angle Type Reflectors

These may be classified as special service reflectors. In the larger sizes they are quite generally used in erecting shops, machine shops along crane bays and similar classes of work.

Where general lighting is provided by means of reflectors placed high (above crane runways or in "monitor" roofs), it sometimes is necessary to build up the illumination for work on machinery placed along the sides of the building. In such cases angle reflectors are mounted along the side walls or on the center or side line columns. In this way both the vertical and horizontal illumination is built up to the necessary degree. In the smaller sizes angle reflectors are used for local lighting. They are used largely for

Watts Per Square Foot Required for Different Intensities.

Intensity in Foot Candles	Type Lamp	WATTS PER SQUARE FOOT WITH VARIOUS TYPES OF REFLECTORS					
		ONE ROW OF OUTLETS			MORE THAN ONE ROW OF OUTLETS		
		RLM Dome	Bowl	Glassteel Diffuser	RLM Dome	Bowl	Glassteel Diffuser
1	Mazda C Clear	.19	.23	.22	.15	.19	.20
2		.36	.44	.43	29	.35	.35
3		.52	.61	.60	.42	.50	.49
4		.64	.79	.78	.52	.65	.65
5		.81	.95	.93	.65	.78	.75
6		.97	1.15	1.10	.78	.94	.90
8		1.20	1.50	1.45	.97	1.20	1.15
10		1.45	1.80	1.75	1.20	1.45	1.40
12		1.80	2.15	2.10	1.45	1.70	1.70
16		2.30	2.70	2.65	1.85	2.20	2.10
1	Mazda C Bowl - Enameled	.22	.26	.....	.19	.23	.....
2		.43	.51	.....	.35	.42	.....
3		.60	.72	.....	.49	.59	.....
4		.78	.93	.....	.65	.78	.....
5		.93	1.11	.....	.75	.90	.....
6		1.10	1.32	.....	.90	1.08	.....
8		1.45	1.74	.....	1.15	1.38	.....
10		1.75	2.10	.....	1.40	1.68	.....
12		2.10	2.51	.....	1.70	2.04	.....
16		2.65	3.17	.....	2.10	2.40	.....

Spacing and Mounting-Height Table

Mounting-Height Above Floor Feet	Maximum Spacing Distance Between Outlets (for plane 30 in. above the floor) RLM Standard Dome, or Bowl Type Feet	Glassteel Diffuser Feet	Mounting-Height Above Floor Feet	Maximum Spacing Distance Between Outlets (for plane 30 in. above the floor) RLM Standard Dome, or Bowl Type Feet	Glassteel Diffuser Feet
9	11	10	13½	18	16½
9½	12	10½	14	19	17
10	12½	11	14½	20	18
10½	13	12	15	21	19
11	14	13	16	22½	20
11½	15	13½	17	24	22
12	16	14	18	26	23
12½	17	15	19	27½	25
13	17½	16			

sign and billboard lighting. A later article will explain their use in this class of service.

Vapor-Proof Reflectors

In refineries, powder plants, flour mills, acid plants, refrigeration plants and similar places, the furnishing of electrical illumination entails guarding against explosive vapors, gases, corrosive fumes and moisture. To meet the demands of this class of service, vapor-proof reflectors are available.

These are usually an adaptation of the standard dome reflector with suitable vapor- and gas-proof units provided for the light globe. These units have the usual porcelain enameled finish provided and are spaced one and two-thirds times the mounting height.

Wide-Type Reflectors

This is a type known as the flat concentric reflector, designed for outdoor lighting, and is used in yards and over platforms where a wide distribution of light is desired. These reflectors must be mounted high as no means is provided for shielding, and the glare is very apparent.

Shallow dome reflectors are another wide distribution type available and are usually used in place of the flat concentric type. This type is much deeper and provides much better protection from the filament glare. Such reflectors are suitable for indoor installation or wide spacing and other installations where close vision is not essential.

Special Service Reflectors

Under this general classification we have "mill-type lamp" reflectors, tennis court reflectors, sewing machine reflectors, mail-case reflectors, and many other types. Show-case and show-window reflectors will be covered in a later section of this series.

Watts Per Square Foot

In the table given herein the values have been computed on a basis of the average lumens per watt for most common sizes of Mazda C lamps, and the approximate utilization factor for the conditions assumed. Depreciation in light output, due to dust, aging of lamps, etc., has been covered by ample allowances. Adherence to the values given in the table will provide the intensities recommended for the various classes of manufacture.

The given factors, such as 0.19, 0.23, 0.27, etc., are the wattage per square foot required to produce certain foot-candle intensities with various reflector and lamp equipment for large and small rooms.

To use the table, locate the factor for the type of reflector and lamp it is desired to use opposite the foot-candle intensity, as determined from the list given in the August installment of this series. Multiply this factor by the total floor area in square feet, and the product will be the total wattage required. If this total wattage is divided by the number of outlets, the proper lamp size will be determined.

Location of Outlets

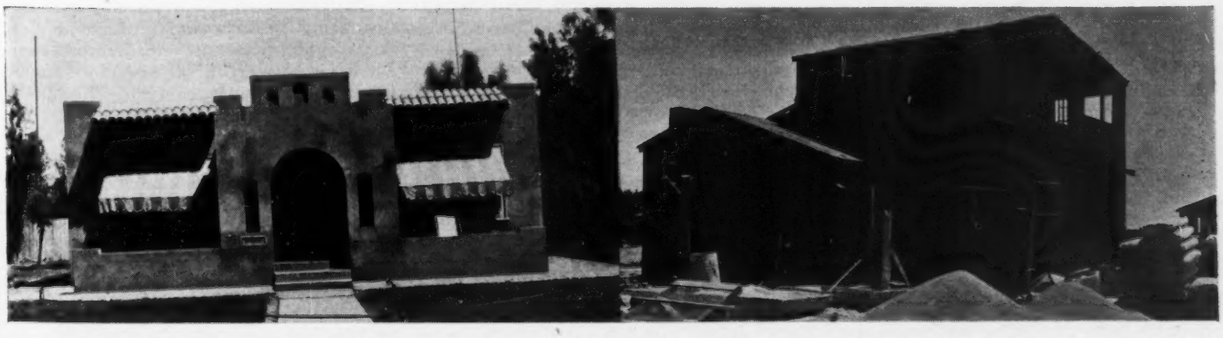
In any class of lighting it is very important that the outlets be properly located. This rule applies to all three of the classifications of lighting given herein: general, group and local.

It can be seen readily that for local or group lighting the units must be located with reference to the work. For general overhead lighting the outlets should be located in a symmetrical manner, using the distributed unit system. As stated before, this consists of locating the units at centers of imaginary squares or rectangles. The heights of ceilings and size of bays are the most important factors determining the location of outlets. Also the distribution factor of the reflector used must receive considerable consideration.

The spacing distance between outlets for a reflector suspended a certain height is determined by the distribution factor of the reflector. The table given herein has been compiled, showing the maximum distance between outlets for different types of reflectors when suspended at stated distances above the floor. It is assumed that the working plane is 2 ft. 6 in. above the floor.

The writer is indebted to the Ivanhoe-Regent Works of the General Electric Company for much of the data contained in this article.

Red Seal Blazes New Electric Trail in the Desert



Red Seal homes are now making their appearance in the Imperial Valley. The home of Dr. Rice, at Calexico, Calif., is the first Red Seal home in the southern part of the Valley. The first Red Seal home in Indio, in the Coachella Valley, was recently erected by Arthur Wood, builder and contractor, for Mr. Goodspeed, business manager of the *Indio News*. Wiring was done by Ralpth Alder, of Indio. Following a recent meeting in Coachella Valley conducted by George Rankin, field representative for the California Electrical Bureau, prospects of getting many more Red Seal homes in this territory have been uncovered.

News of the Industry

Talking Movies Feature Santa Monica A.I.E.E. Convention

Lively Debate on Design Questions and General Discussions of Practical Operating Problems Liven Sessions of Annual Gathering

THE Los Angeles Section of the American Institute of Electrical Engineers played host to Pacific Coast and Eastern delegates and guests attending the eighteenth annual Pacific Coast A.I.E.E. convention held Sept. 3-6 at the Miramar Hotel in Santa Monica, about fourteen miles from the heart of the city of Los Angeles. The various Pacific Coast sections of the Institute were well represented and a perusal of the registry list revealed the names of prominent delegates and visiting engineers from many points east. Representatives of student branches of the Institute at many Western colleges and universities were in attendance, contributing much interesting and valuable material at the two half-day sessions devoted to student papers. One entire day was devoted to golf and a wide variety of inspection trips to points of interest in southern California, and both classes of activity were well patronized.

Radio Interference

Dealing with the subject of radio interference as caused by transmission line insulators, Ellis Van Atta, of the Pacific Power & Light Company, and E. L. White, of the Puget Sound Power & Light Company, presented a paper discussing the phenomenon of brush discharge on various types of transmission-line insulators and showing the difference between the type of interference caused by corona discharge and brush discharge. The authors maintained that interference arising from high-tension transmission lines and equipment may largely be traced directly to corona and brush discharges between metallic surfaces, between insulating surfaces, or between metallic and insulating surfaces. Consequently, to free a high-tension line from radio interference all such discharges must be stopped, a feat that may be accomplished through rigid inspection and regular maintenance. Line hardware must be tight and adjacent pieces of hardware either must be well bonded or well separated, conductors and tie wires must make perfect electrical contact with insulator tops, and insulator supports must make perfect electrical contact with the insulators.

Discussion of this paper emphasized the importance of adequate maintenance and careful initial construction and backed up the authors' plea for the redesign of standard insulators.

Insulator Flash-Over Tests

R. J. C. Wood, of the Southern California Edison Company, reported upon the results of two and a half years' experimenting with high-tension line insulation immediately adjacent to the ocean. Since late in 1926 a test rack on which are installed ten different types of insulators has been in operation at a potential of 150 kv. to ground and under close observation at the company's Redondo, Calif., steam plant, a point noted for its ocean fog. Based upon an analysis of carefully tabulated data obtained from this long-time test the author stated that he was satisfied that the "surface leakage resistance" is a close measure of the ability of these types of insulators to stand up under such conditions as are found at Redondo and that there is no particular virtue in one shape over another, except in so far as it may afford more surface resistance and permit the use of fewer units to provide the total resistance required. (The term "surface leakage" as used by the authors represents an arbitrary unit evolved by him which he termed "not any measured resistance, but the calculated surface resistance from cap to pin of a single insulator unit, assuming the exposed porcelain surface to be uniformly coated with a conducting layer of moisture.")

Other conclusions arrived at included the author's statement that any one insulator string will not consistently arc over in preference to another unless its surface leakage resistance is less than 80 per cent of that of the other; that a surface leakage resistance of 11.0 in inch-units (calculated as the line integral of length divided by circumference along the shortest surface path from cap to pin) per string appears sufficient for a steady voltage of 150 kv. to ground, provided additional allowance is made for surges which may occur on a given transmission line; that it has been found practical to clean some insulators while energized with a water spray and thus permit the use of fewer units than otherwise would be safe.

A laboratory study of the 60-cycle flash-over characteristics of long suspension insulator strings was the subject of a paper presented by R. H. Angus, a graduate student of Stanford University. The author reported upon studies of flash-over characteristics of long insulator strings in various positions, made up of various kinds of insulator units, and subjected to various voltages up to 1,100,000 volts. Based upon his test results the author concluded that:

1. With insulator strings in any position in which they are shielded either by the conductor or by specially designed shields, a 15 per cent variation in pitch does not affect the arc-over, but that with unshielded strings cascading and "priming" may result upon an increase in pitch, lowering the flash-over value. The author recommends for unshielded strings that the pitch should not be more than about half the diameter of the unit in question.

2. All strings except perhaps those having a length of less than 15 in. should be shielded. In some cases the conductor will provide the necessary shielding and in others it must be provided by a special shield.

3. The flash-over voltage-distance relation is not a straight line but lies between the point-to-point and point-to-ground-plane curve.

4. The lowest flash-overs are obtained with strain strings.

5. Strain strings need not be more than 5 per cent longer than straight suspension strings. In other words, only one unit in twenty need be added to a normal vertical string to guard against the capacity effect of strain towers.

6. Double strings have the same flash-over strength as a single string of the same length if both are adequately shielded, although double suspension strings show a higher "mortality" than single strings.

Wood Poles as Insulators

Comprehensive tests on the impulse insulation characteristics of wood and of combinations of insulators and wood as used in wood-pole transmission line construction were discussed in a paper written by H. L. Melvin, of the Electric Bond & Share Company, New York, and presented by L. R. Gamble, of The Washington Water Power Company, Spokane. In presenting this paper, Mr. Gamble emphasized the point that there is a definite limit to the use of wood for impulse spark insulation but he pointed out also the obvious possibilities of vastly improving the insulation characteristics of a wood-pole transmission line by observing some of the facts brought out by the tests reported upon. The spark-over resistance of wood and porcelain

cannot be added directly because of the different characteristics of the two materials, but the two may be combined properly to increase the effective insulation. Results of the tests indicate that each foot of pole is equivalent in impulse insulating value to one disk insulator.

Thus the proper insulation of guy wires, the points on the pole at which guy wires are attached, the use of metal crossarm braces and other such items, have a very definite effect upon the insulation strength of the structure in question. As an example, Mr. Gamble mentioned one of the new high-tension lines of The Washington Water Power Company where, by properly placing the guy wires and by eliminating metal crossarm braces, the impulse insulation factor for a given structure was raised from 900,000 to 1,600,000 volts. It is expected that these modifications in design will materially aid the transmission line in withstanding lightning shocks.

Theory of Electrical Conductivity

To indicate the degree of success with which the modern theory of the electron has provided a unified treatment of the baffling physical problem surrounding the study of atomic structure, Dr. W. V. Houston of the California Institute of Technology, Pasadena, gave a short lecture covering recent developments in the theory of electrical conductivity. This very interesting and rather involved subject was presented at the only evening session of the convention.

Discovery of the wave nature of electronic action and the development of stastistical mechanics adapted to describing the behavior of large groups of electrons, have made it possible to explain away the difficulties connected with the theory of electrical conduction in metals. It now is possible to explain the electrical properties of metals as due to a body of free electrons which can move about inside the metal of an electrical conductor, but which cannot escape through the surface of the metal because of the relatively heavy electrical forces present there. On this basis quantitative expressions may be derived for the emission of electrons by hot bodies, for the electrical resistance as a function of the temperature, for the thermoelectric forces, and for other phenomena.

According to Dr. Houston, studies involved in the development of radio tubes have done much to expedite the development of the present theory. In emphasizing the importance of further study along these lines, the speaker stated that a certain percentage of the noise emanating from radio loud speakers was due to the erratic motion of electrons and molecules within the conductors connecting the various parts of the set. He also stated that according to this theory, electrical resistance is due to irregularity in molecular arrangement within the electrical conductor, such as might be caused by the presence of impurities or by heat.

Paint for Temperature Control

A paper prepared by Lynn Wetherhill and V. M. Montsinger, General Electric Company, Pittsfield, Mass., and discussing the effect of color of paint upon operating temperature of self-cooled transformers under normal service conditions, found both support and refutation in resulting discussion. The effect of color upon the temperature of self-cooled transformers under service conditions has been for many years a much discussed question. The theory has been that, based upon the relative absorbing powers of the various colors commonly used in painting such transformer tanks, the lighter colors should give appreciably lower temperatures in hot climates. The paper outlined the results of three different field tests conducted under actual operating conditions and these results did not show the expected advantages for the lighter colors.

In general, the authors' concluding remark, that repainting of transformer tanks, even in warmer sections of the country, should be based upon a consideration of durability and appearance rather than upon any possible heat-transfer characteristics of a special paint, met with general approval in the discussion although there was some dissenting opinion noted.

Population as Electrical Index

N. B. Hinson, Southern California Edison Company, outlined a method of accurately predicting future demands for electrical power based directly upon population data. Mr. Hinson does not use the so-called "biological" curve because of the great difficulty of projecting such a curve into the future with any degree of accuracy. Population rates constantly are changing and hence the slope of the biological curve also constantly changes, a fact which makes accurate projection impossible.

After an extensive study of more than 70 cities and towns of all sizes in southern California, Mr. Hinson has arrived at an accurate figure showing the average power demand per inhabitant and showing the trend of growth of this power demand. With these and other data Mr. Hinson has laid out a set of straight line "curves" using kva. peak demand as ordinates and population expressed in thousands of persons as abscissae. Mr. Hinson has based his curves upon careful analytical studies extending over a long period of time and for the past several years has been guiding the power developments of the Southern California Edison Company largely in line with his population studies. As the figures for each succeeding year are made available as historical records, the points so represented have well substantiated Mr. Hinson's straight-line "curve."

A Western A.C. Network

An operating experiment conducted by The Washington Water Power Company comprising the changing over of its downtown distribution system from a d.c. network to an a.c. low-voltage network with certain special features, was described in a paper prepared by L. R. Gamble and Earl Baughn of The Washington Water Power Company, Spokane. Several ingenious developments have been incorporated into this network scheme, including a special arrangement of pilot-wire relays and the use of secondary fuses instead of the more usual network protectors. The system followed by The Washington Water Power Company has been the installation of ring primary feeders and a 4-wire, 120/208-volt secondary network supplying a so-called universal service.

Perhaps one of the most interesting features of the whole change-over was the fact that, according to the author, absolutely no trouble has been experienced with the use of standard motors on the 208-volt circuits. Where cooking and heating equipment was involved, using 230 or 240-volt elements, the situations were cared for by the installation of auto-transformers raising the service voltage from 208 to 228.

The authors believe that their system as developed without the use of network protectors will give satisfactory service, but a substantial and sustained difference of opinion was noted in the discussion which pointed out that the weight of evidence and experience was in favor of the use of network protectors rather than the fuses described by Mr. Gamble. Certain questions of relative cost were raised but were not settled in the discussions.

Some Research Problems

C. E. Skinner, assistant director of engineering work, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., presented a paper tracing the development of insulating oil through the past 35 years or so, outlining the many difficulties that had been encountered.

Representing a continuation of the studies that have brought prominence to him and his associates, a paper discussing the characteristics of flames resulting from electric arcs was prepared by Joseph Slepian, consulting research engineer of the Westinghouse Electric & Manufacturing Company, East Pittsburgh.

Many interesting data concerning the design features that have made large turbine generators physically possible were discussed in a paper prepared by W. J. Foster and M. A. Savage of the General Electric Company, Schenectady, N. Y. This was a descriptive paper tracing briefly the history of the past five years in large turbine design and mentioning some of the characteristics of the 160,000-kw., 25-cycle, 1,500-r.p.m. generating unit constructed for the New York Edison Company. Weight has been greatly reduced, cooling has been expedited materially by the use of totally enclosed recirculating cooling systems and even by the introduction of hydrogen gas into these cooling systems, and new shop methods have increased the physical strength and operating reliability of large units.

High-Voltage Fuses

According to Roy Wilkins, consulting engineer, Pacific Electric Manufacturing Corporation, San Francisco, present high-tension fuses may be grouped according to their method of functioning as (1) plain fusible lengths, (2) expulsion types, (3) mechanically retracted contacts, and (4) explosively propelled contacts. The author claims that all of these in common have several faults which limit their maximum usefulness, and outlined what he considered to be desirable operating requirements of an acceptable fuse as follows: (1) operation on a given current within a given time, (2) operation to clear the circuit under all conditions, and (3) to provide circuit isolation after clearing.

Transformer Studies

J. K. Hodnette, transformer engineer of the Westinghouse Electric & Manufacturing Company, Sharon, Pa., presented a paper discussing the effects of surges upon transformer windings as based upon a study made on the reaction of transformer windings in grounded neutral systems when subjected to transient voltage surges such as exist on normally insulated lines. Switch operations, arcing grounds and lightning surges may cause the development of voltages exceeding 2.5 times the normal voltage to neutral on neutral grunded systems and six times normal voltage on isolated neutral systems. The author has studied the effects of these voltages upon transformer windings and reported the measurement of voltage distribution throughout the windings under such surge conditions. His data indicated that the worst stresses both within the winding and to ground were in the vicinity of the line coil, thus giving rise to his recommendation of the use of graded insulation.

Animated and even acrimonious discussion of both theory and practice ensued immediately upon the presentation of this paper, showing a substantial difference of opinion regarding the questions of transformer design involved in Mr. Hodnette's presentation. It is to be expected that lengthy written discussion on this subject will appear in subsequent publications of the A.I.E.E.

The parallel operation of transformers having different ratios of transformation was discussed ably in a paper prepared and presented by Mabel MacFerran, an engineer in the operating department of the Southern California Edison Company. Miss MacFerran developed in her paper an equation for use in meeting emergency conditions which might necessitate the paralleling of different transformer banks, the impedances of which as expressed in percentage form are not equal. This equation makes it possible to calculate simply what change should be made in the ratio of transformation of the transformer bank with the lower percentage impedance in order to prevent its being overloaded when the total load may approach the combined capacity of the two banks in question. The author emphasized the point that such an expedient is at best only a make-shift and justifiable only when maintenance of service is the paramount consideration and efficiency for the time being is of secondary importance. When such emergency conditions do arise, the method developed in Miss MasFerran's paper aflords a simple accurate means of solving the problem.

System Stability

Factors determining the power-carrying capacity of a transmission system were described briefly in a paper prepared by T. H. Morgan, assistant professor of electrical engineering, Stanford University. Professor Morgan discussed the application of series syncronous condensers for the generation of the voltage consumed by line inductance and made certain comparisons between this proposed series method and the present normal operating scheme of using parallel synchronous condensers.

Professor Morgan presented his ideas not as completely worked out plans, but in the hope that his efforts might point in some way toward the solution of this vital problem in power transmission. He admitted that because of its departure from methods now employed he probably would find few supporting advocates.

A general outline and review of the progress in the study of the questions of system stability were presented in a paper prepared by I. H. Summers and J. B. McClure, of the General Electric Company, Schenectady, N. Y. The authors presented in this paper simplified methods and mathematics for treating the problems of system stability, including numerous sample calculations and applications of the principles involved.

In presenting the paper Mr. Summers closed with a plea for continued efforts in the development of high-speed, high-tension circuit breakers and high-speed relays since, upon the development and satisfactory operation of such equipment seems to rest the ultimate solution of system stability problems. Resulting discussion presented by operating men echoed the author's concluding remarks.

Talking Movie Developments

Undoubtedly the most generally popular subject presented at the Santa Monica convention was "Electrical Engineering of Sound-Picture Systems," a paper prepared by K. F. Morgan, Electrical Research Products, Inc., and T. E. Shea, Bell Telephone Laboratories, Inc. This paper described the technique and apparatus involved in sound-picture recording and reproduction, emphasizing the practical application of electrical engineering. Greatly improved quality in recording and reproduction of sound pictures is being brought about, according to the authors, through studies and experiments.

Presentation of this paper was accompanied by interesting exhibits of the delicate and accurate machinery involved for both recording and projection. Results of the latest improvements in sound recording were demonstrated through three different sound pictures which were shown.

Communication and Control

A brief review of the history of development of step-by-step dial telephone systems in small communities adjacent to metropolitan areas was presented in a paper prepared by F. O. Wheelock, of the Southern California Telephone Company, Los Angeles. Mr. Wheelock outlined the economic, engineering and psychological factors entering into the development of a satisfactory communication system where the number of customers is relatively small. He described also the equipment used and the maintenance systems involved.

A completely enclosed recirculating wind tunnel is in operation at the California Institute of Technology, Pasadena. This equipment and its related intricate and accurate control system was described in a paper prepared by W. A. Lewis, formerly teaching fellow at the California Institute and now in the general engineering department, Westinghouse Electric & Manufacturing Company, East Pittsburgh. The paper described the 500-hp. propeller motor and the other related equipment which permits an air velocity range of 20/1 with a top velocity of 200 miles per hour.

Student Sessions

At the two half-day student sessions twelve student papers were presented:

1. Experiences With a Cathode-Ray Oscillograph in a College Laboratory, by C. C. Lash, California Institute of Technology, Pasadena.
2. Characteristics of an Electrostatic Loud Speaker, by S. J. Somers and G. E. Mattos, University of Santa Clara (Calif.).
3. High-Voltage Streamers and Gradients by W. G. Hoover and C. McLean, Stanford University.
5. Voltage Distribution on High-Tension Insulators, by N. M. Chapman and Floyd Gowans, University of Utah.
6. Voltage Amplification of the Screen Grid Tube as an Intermediate Frequency Amplifier, by Frank Giovanini, University of Washington.
7. Influence of Rotor Impedance on the Starting Characteristics of Squirrel-Cage Induction Motors, by A. V. Haeff, California Institute of Technology.
8. The Heating of Copper Conductors by Transient Electric Current, by S. O. Rice, Oregon State College.
9. Cyclic and Transient Illumination of Incandescent Lamps as Measured by the Photo-Electric Cell, by Z. J. Atlee and R. W. Mize, Oregon State College.
10. Study of the Losses of a 25,000-Kva. A.C. Generator, by J. G. Pleasants and M. Tucker, University of Southern California.
11. The Operation of Two Synchronous Motors in Series, by C. R. Koch, Stanford University.
12. Power Losses by Radiation From Domestic Hot Water Tanks, by R. D. Wailes, University of Washington.

The 1930 Pacific Coast convention will be held in Portland, and tentative plans place the time as either the last week in August or the first week in September. Those in charge wish to set the date at a time convenient for the members of the various student branches and also to permit the use of the Labor Day week-end for travel.

Propagandist Warning Sounded at Utilities' Convention

Next Year's Officers Elected and Plans Furthered for Merger of Utility Associations of Three States Into Rocky Mountain District

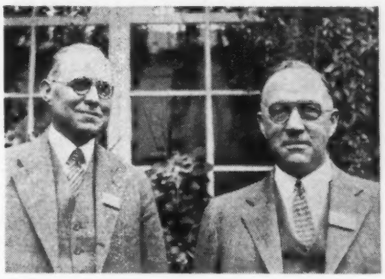
THE utilities' convention at Glenwood Springs, Colo., Sept. 2-3-4, was broad in its scope and significant in its forecast for the future. Occurring on the dates set for the tenth annual conference of the Rocky Mountain Division of the National Electric Light Association, the meeting included the twenty-fifth annual convention of the Colorado Utilities Association and the eighth annual convention of the Wyoming Utilities Association. Delegates at large were present from New Mexico, representing, largely, gas interests, and two major executives of the American Gas Association, B. J. Mullaney, vice-president, and Alexander Forward, managing director, were accorded official recognition.

Consensus of opinion indicates that a merger of Colorado, New Mexico and Wyoming uitility associations into a Rocky Mountain district is imminent. Such a move has been afoot for several years, and a committee was formed at Glenwood Springs to determine the working possibilities of such an organization.

W. D. Johnston, of Casper, Wyo., general manager, Mountain States Power Company's Wyoming division, acted in dual capacity as president of the Rocky Mountain Division, N.E.L.A., and president of the Wyoming Utilities Association. In his speech he dedicated the convention to "Light's Golden Jubilee" and Thomas A. Edison. He also urged, in no uncertain terms, that every effort be made to combat reflections cast on private utilities by propagandists favoring government ownership of public utilities who have been instrumental in bringing about federal investigation of utilities' management and methods.

Paul S. Clapp, N.E.L.A. managing director, followed up this thought in his address by pointing out that nearly two million customers and employees have invested in the securities of privately owned utilities and should be protected against the hazard imposed by political and academic propagandists. Mr. Clapp stated that within the past decade the number of electrically wired homes in the United States has increased from 8,000,000 to more than 19,000,000, but that 94 per cent of these homes are without electric refrigerators, 96 per cent are without electrical ranges, 98 per cent without water heaters, 70 per cent without washing machines and 60 per cent without vacuum cleaners.

T. P. Pfeiffer, manager of the advertising division, Byllesby Engineering and Management Corporation, commented on the widespread entrance of utilities into the merchandising field and pointed out that the utilities' interest in this phase was simply to boost their power loads. As community builders, Mr. Pfeiffer asserted, utility companies are vastly important. "The progress of a utility company," he said,



V. L. BOARD (*left*), retiring president of the Colorado Utilities Association, and J. A. CLAY, new president of the Rocky Mountain Division, N.E.L.A.

"is closely bound up with the growth of the community it serves." He delved into history to show how utilities had employed advertising to foster and maintain public good-will.

Sound motion pictures featured Thomas A. Edison, who appeared in the same film which was presented at the N.E.L.A. convention at Atlantic City in June, and Sir Ernest Benn, of London. Movies and sound records of the Atlantic City session were also shown, together with motion picture records of the 1928 Glenwood Springs convention.

Ray M. Morris

who will take office next July as president of the Colorado Utilities Association.

The sports program was an outstanding success from the viewpoint of John E. Loiseau, secretary of the Public Service Company of Colorado, who placed himself among the immortals of golf by making a "hole in one." Mr. Loiseau became first vice-president of the Rocky Mountain Division, N.E.L.A., through election, though not, it was explained, on the strength of his golfing achievement.

J. A. Clay, Western Colorado Power Company, Durango, was named president of the Rocky Mountain Division, N.E.L.A.; W. W. Nielsen, New Mexico Power Company, Santa Fe, second vice-president; and Fred Norcross, Home Gas & Electric Company, Greeley, Colo., third vice-president.

Ray M. Morris, Mountain States Telephone & Telegraph Company, Denver, became president of the Colorado Utilities Association; R. W. Booze, Colorado Central Power Company, Golden, first vice-president; W. N. Clark, Southern Colorado Power Company, Pueblo, second vice-president; and J. L. Adams, Denver Tramway Company, third vice-president.

H. L. Williams, Utah Power & Light Company, Evanston, Wyo., was chosen president of the Wyoming Utilities Association.

The newly elected personnel will take office July 1, 1930.

Lighting Rates Reduced by Edison Company

After consultation with the California Railroad Commission in an informal conference, and with the approval of the commission, the Southern California Edison Company has filed new reductions in its maximum lighting rates, effective Nov. 1, 1929, with the expectation that consumption of electrical energy in the household will be further augmented. The reductions will result in a saving to its 427,000 consumers aggregating $1,400,000 per annum, it is estimated.

The rates have been reduced from 6 cents to 5.6 cents per kw.hr. from 5.6 cents to 5.3 cents, and 5.3 cents to 5 cents, according to the territory affected. A lower rate also will be put into effect covering the energy supplied by the company to the Los Angeles Department of Water and Power.

Consideration is also being given to modification of the industrial power rates in the congested area, and it is expected that when studies now being made by the engineers of the Railroad Commission and of the company are completed, which probably will be about the first of the year, such modification will be put into effect.

Action Pending at Capital on Minidoka Project and Flathead and Colorado River Rights

Washington Correspondence.

WORKING toward an equitable division of the power profits from the Minidoka reclamation project on the Snake River in southwestern Idaho, the Secretary of the Interior has appointed a committee of three to investigate the rights of conflicting claimants. The final decision is expected to have an important bearing on the major federal projects throughout the West, especially those on the Colorado and Columbia Rivers. Experience has shown that power developed in conjunction with irrigation, by a relatively small outlay for generating and transmission facilities in addition to the dam already built for water storage, starts as a sideline but rapidly becomes a large factor in project success as a market for current is built up by settlement of the irrigation districts. On the Salt River project, power sales already have paid for the cost of the entire development, irrigation included.

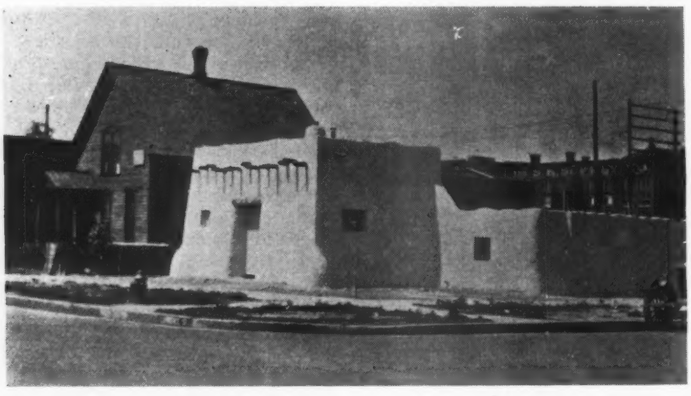
In the Minidoka case now at issue, power sales, during the six months when the plant is not being used for irrigation requirements, have paid for the plant and transmission lines and in addition a surplus of $1,000,000 has accumulated. Power profits run about $100,000 per year and are increasing.

Questions involved in the development of the Flathead River will be considered at a public hearing Oct. 28 before the executive secretary of the Federal Power Commission in Washington.

The commission recently announced its intention of acting favorably on the application of the Rocky Mountain Power Company covering this project. That company applied for a preliminary permit covering this project in 1920. Because of engineering studies that had to be made the commission was not in a position to act on that application so the company proceeded without a permit to make its preliminary investigations. When the studies made on behalf of the Power Commission were completed the Rocky Mountain Company then filed an application for a license.

Passage of the Swing-Johnson bill has diminished in no sense certain of the controversial features pertaining to the development of the Colorado River. The demand that no rights be granted on that river or its tributaries is as strong as ever. On the other hand those whose projects have been held in abeyance for years are anxious to proceed with them as is provided in the water power act. This is particularly true with regard to the projects on the Gila River. A number of those who have constructed projects in the Colorado River watershed are anxious to have legalized their occupancy of public lands. As Congress has specifically and definitely lifted the ban which it laid upon projects in the watershed while the bill was pending, it is assumed that the Federal Power Commission would feel that it would be taking a good deal upon itself to withold action further.

Denver Substation a Pueblo Structure



REPLACING the old Barker substation, first electric power station between the Mississippi River and the Pacific Coast, the novel edifice shown above is being constructed by the Public Service Company of Colorado at Twenty-First and Lawrence Sts., Denver. The new substation was designed by D. J. Ryan of the Public Service Company's engineering staff, following studies of Indian Pueblos in New Mexico and Arizona. It occupies a site several blocks distant from its predecessor.

Instead of a lawn, the building will be surrounded by desert vegetation such as cactus, sotol and greasewood. It will contain an automatic transformer and feeder lines and will cost approximately $100,000 with equipment.

Denver Announces Plans for Light's Golden Jubilee

Light's Golden Jubilee in Denver will take the form of a Pageant of Progress with merchants, industries and city tying in on exhibits of fashions, transportation facilities, railroad equipment, lighting and telephone.

One of the feature events is scheduled to be an illuminated football game between the University of Denver and Colorado College at the new Denver University stadium the night of Oct. 19. Floodlighting equipment costing $4,500 is to be installed.

The Public Service Company of Colorado and City of Denver are co-operating in the illumination of the principal business thoroughfares in Jubilee motif. The Gas & Electric Building, rated by Edison himself as "the best lighted building in the world," houses the Public Service Company and is to be especially ornamented.

One night of Edison Week is to be devoted to an air circus at Lowry and Curtiss fields where elaborately illuminated planes will maneuver and "stunt." The municipal airport is to be dedicated with appropriate ceremonies as an outstanding preliminary.

The Denver Post is sponsoring a program at the city auditorium where the international radio hookup honoring Edison is to be broadcast through special amplifiers, with outside attachments for the benefit of those who will not be able to enter the building. At the Union Station a public dance is to be staged, featuring kerosene lamps and styles of long ago in contrast with modern lighting and habiliments.

All the schools are arranging for classes to have Edison programs, churches have entered into the spirit of the occasion, and private citizens whose lawns and gardens are "show places" are arranging for floodlighting effects.

Foshay Acquires Control of Dixie Power Company

Announcement of the purchase of the controlling interest in the Dixie Power Company by the W. B. Foshay Company of Minneapolis, Minn, was made on Sept. 6. The Dixie Power Company serves seventeen communities in Washington and Iron Counties, Utah.

The operation of the company will be in the hands of the Public Utilities Consolidated Corporation, an operating and holding company for the Foshay Company, and it is expected that the new arrangement will be in effect within ninety days. The estimated value of the Dixie Power Company's holdings is $1,500,000.

It is stated that the acquiring of control of the Dixie Power Company by the Foshay interests is one of the final steps in a plan to gain control of all power plants in the vicinity of the proposed Boulder Dam, with a view to furnishing the government with power during the construction of the dam.

Oregon Water Shortage Not Considered Alarming

By Increasing Steam Generation All Companies Are Meeting Load Demand

REPORTS on water conditions in Oregon received by the Public Service Commission and the state engineer of Oregon indicating a serious shortage for power purposes should not be construed as indicative of the existence of a serious situation, in the opinion of power company officials. Companies operating in the western parts of Oregon and Washington report stream flows somewhat less than normal for this time of year, but in all cases the situation has been anticipated and steam auxiliaries have been ample to take care of the growing demands of the territory.

The first unit (35,000 kw.) of the new Shuffleton steam plant of the Puget Sound Power & Light Company, Seattle, was brought in on schedule early in September and carried full load on Sept. 19. A recent peak of 170,000 kw., which occurred on its system early in September, approached very closely the company's forecast of expected load increase. The company reports slightly lower stream flows than normally occur at this time of the year.

Another new steam unit brought in in anticipation of increasing demands is the 25,000-kva. unit of the Northwestern Electric Company, Portland, at its Lincoln St. station. This unit was placed in operation, also on schedule, on Sept. 7. The company reports that, because of the cold spring and early summer holding back the run-off in the White Salmon watershed, there is an approximately normal stream flow on the White Salmon River, which serves its Condit plant.

The worst situation reported is that of the Portland Electric Power Company on the Clackamas and Oak Grove Rivers where the flow is considerably below normal for this time of year, a situation which has caused some increase in the company's steam generation. During recent weeks steam has accounted for from 50 to 58 per cent of the total power output of the company when normally this percentage runs from 45 to 50 per cent. Hog fuel supplies of the company have been depleted somewhat faster than had been expected, and a further cessation of rain will force the use of oil for fuel.

The Mountain States Power Company reports a stream flow below normal in its territory and that of The California Oregon Power Company, but the power supply is ample.

Utilities' Rates Examined by California Commission

Rates of gas and electric companies have been occupying the attention of the California Railroad Commission, which on Sept. 4 set for hearing on Nov. 12 a rate case instituted by it against the Los Angeles Gas and Electric Corporation. Four other public utilities into whose rates the railroad commission has instituted investigation are the Southern Counties Gas Company, Modesto Gas Company, Roseville Telephone Company and the Associated Telephone Company.

The investigations have been instituted as the result of recent hearings conducted by the commission on orders to a large number of public utility companies throughout the state to appear before the commission and show cause why their rates should not be investigated. The report filed by the commission's experts following a survey of the annual reports of the utilities showed that the Los Angeles Gas and Electric Corporation had a rate of return for its entire system of 9 per cent in 1928 and 8.9 per cent in 1927. Computed on the common stock and surplus combined, a return of 16.6 per cent was shown for 1928 and 15.86 per cent in 1927.

The report on the Southern Counties Gas Company showed a rate of return of 10.85 per cent in 1928 and 13.6 per cent in 1927. Computed on earnings on common stock and surplus combined the rate was 18.22 per cent in 1928 and 18.78 per cent in 1927. The earnings of the other companies were reported to be considerably in excess of what would be considered a fair rate of return. The explanations made by the companies were not considered satisfactory by the commission, and orders instituting the investigations were issued.

On Aug. 27 the railroad commission held its first hearing in the investigation of the rates of the Pacific Gas and Electric Company. This suit, and a similar one involving the rates of the Great Western Power Company, based on applications filed originally in 1925 by the Cities of San Francisco, Oakland, Berkeley and Piedmont, for reduction in electric rates, were restored to the calendar by the commission which on its own motion instituted investigations to broaden the scope of the complaints to include the entire systems of the companies.

At the hearing on Aug. 27 the commission's experts estimated the rate base of the Pacific Gas and Electric Company at $241,948,403 for the year 1929, the gross revenue at $42,750,800, and the expenses at $21,444,000, which would give an estimated net return of $21,306,800, with a rate of return of 8.82 per cent.

The next hearing has been set for Oct. 1 when the Pacific Gas and Electric Company will submit its estimates and analysis of the commission's figures. October 2 has been set for the hearing of the Great Western Power Company case.

Rights Claimant Proposes New Colorado River Plan

An interesting claim to priority of water rights in the Colorado River is made by Capt. Jay Turley, former water commissioner of New Mexico, now of Los Angeles, who has submitted a proposition to Gov. William H. Adams of Colorado whereby necessity for the Boulder Dam would be obviated.

Captain Turley, who claims ownership of 16 per cent of the flow of the Colorado River on the strength of an early-day land grant which carried with it 4,000 sec.-ft. of water in New Mexico, advocates a $3,000,000,000 reclamation project through a series of dams in the Colorado River basin.

If Captain Turley's idea should find favor with Governor Adams, and with other Western states executives who are to be approached in the matter, it probably would change the tenor of the conference over water rights scheduled to take place in Denver Nov. 5. Captain Turley believes the tentative compact under consideration is unfair to upper basin states and he will make drastic changes in the allocation of rights.

P. G. and E. Company Acquires Yuba River Power Company's Electric Properties—The Yuba River Power Company has been authorized by the California Railroad Commission to sell to the Pacific Gas and Electric Company its Bullard's Bar electric properties, including dam, power house and transmission line, connecting that power house with the latter's Colgate power house. The latter corporation will pay the sum of $150,000 in cash and will assume outstanding bonds of the Yuba company, amounting to $1,029,000. The properties in question have been operated a number of years by the purchasing company under a lease agreement covering a period of 25 years, at the end of which the lessee would obtain full title to the properties.

P. G. and E. Company Wins Right to Construct Natural Gas Line—In two decisions issued Sept. 3 the California Railroad Commission granted a certificate of public convenience and necessity to the Pacific Gas and Electric Company to construct and operate a 20-in. natural gas transmission line from Pinoche Pass in Fresno County to Richmond in Contra Costa County, and denied the application of the Western Natural Gas Company for a certificate to construct a similar line from the Kettleman Hills and Dudley Ridge oil fields to Richmond, with branch lines to serve Modesto, Stockton, Lodi and Sacramento. The decision grant-

Equipment of Three Plants Ordered by P.G.& E. Co.

Orders for power plant equipment totaling about a million dollars have been placed by the Pacific Gas and Electric Company, San Francisco. The plant in which the equipment is to be installed, the company receiving the order, and the equipment it is to furnish follow:

For the Salt Springs power house—Allis Chalmers Manufacturing Company—four 12,000-kva., 11/110-kv. transformers.

For the Tiger Creek power house—General Electric Company—seven 20,000-kva., 11/107.5/215-kv. combined transformers and auto transformers.

For the Newark substation—Westinghouse Electric & Manufacturing Company—seven 18,000-kva., 200/100/11-kv. auto and straight transformers.

For the Newark substation—General Electric Company—two 25,000-kva. synchronous condensers. One of these condensers will be equipped with 1,500-hp. synchronous driving motor so that the set may be used as a motor-generator set for the purpose of testing the lines radiating from Newark substation.

Free Talking Film Service Offered by N.E.L.A.

Announcement has been made by the department of public information of the National Electric Light Association of its ability to furnish free movietone film service to member companies, state electrical or utilities associations, and to N.E.L.A. geographic divisions. Transportation costs only will be charged for. These films may be shown in any theaters equipped with the Western Electric sound system.

Through arrangements that have been made with the Electric Research Products, Inc., portable projector equipment may be rented with operators at $75 per day plus the actual cost of transportation and living expenses of the engineer and operator from the service station to the point where the equipment is to be used. On the Pacific Coast these service stations already are located in Denver, Hollywood, Portland, San Francisco, Seattle and Spokane. Arrangements for rental should be made through the department of public information, N.E.L.A., at 420 Lexington Ave., New York.

Western Electric sound systems also may be leased for portable use or for permanent installation by arrangement with the same office.

The N.E.L.A. talking movie film library now has ten reels of film, portraying with sound accompaniment the high lights of the opening of Light's Golden Jubilee, the dedication of the Atlantic City auditorium and convention hall, and the N.E.L.A. convention in Atlantic City in June, including a special film of Thomas A. Edison, talks by leaders of the electric light and power industry, and films made in Europe for the occasion.

Power Company's Window a Red Seal Plea

APPEARING in turn in each of the district offices of the Great Western Power Company of California, this miniature Red Seal home forms an appropriate background for a display of electrical appliances whose use is well provided for in every home that is wired to Red Seal standards.

FINANCIAL NEWS

P. G. and E. Co. to Issue and Sell Common Stock

Permission has been granted by the California Railroad Commission to the Pacific Gas and Electric Company to issue and sell on or before Feb. 1, 1930, to its stockholders at not less than par, $25 per share, $7,820,375 of its common capital stock in the ratio of one share of new stock to each ten of old stock owned by the stockholders; and also to issue and sell to its stockholders in the same ratio on or before April 1, 1930, at $55 per share, 312,815 shares of its common capital stock.

In making the authorization the commission directed attention to the following policy which already has been expressed by it in authorizing similar valuable stock rights:

"It should be understood that if the commission is hereafter called upon to fix applicant's rates or any of them, it will not regard the dividends paid on common stock, issued by applicant at par when the market value of such stock is substantially above par, as representing the cost of money obtained through the issue of such stock."

In authorizing the sale of common stock at $55 per share to stockholders the commission also expressly stated that:

"While the order herein will authorize the issue of the stock at the price suggested by applicant, such order should not be construed as a finding of a value for the common stock of the Pacific Gas and Electric Company."

The proceeds derived from the sale of the $15,640,750 par value are to be used to pay in part capital expenditures of $12,972,236, made prior to June 1, 1929, and also to finance additions and betterments of $84,054,087 already made and proposed for the future.

Sierra Pacific Company Authorized to Sell Bonds—Authorization has been granted by the California Railroad Commission to the Sierra Pacific Power Company, Reno, Nev., which operates an electric service in and about Floriston and Portola and the Lake Tahoe district, and supplies electric energy at wholesale to the Truckee Electric Light and Power Company, the Truckee Public Utilities District and the Southern Pacific Company at Summit, Calif., and also conducts a general public utility business in Nevada, to issue and sell $1,600,000 of its 5 per cent first mortgage and refunding gold bonds due Dec. 1, 1959. The proceeds are to be used to retire $309,000 of outstanding bonds and to liquidate indebtedness to the Sierra Pacific Electric Company.

P.G.& E. Co. Asks Permit to Acquire Snow Mt. Co.

Application has been made to the California Railroad Commission by the Pacific Gas and Electric Company for authority to acquire all of the issued and outstanding capital stock of the Snow Mountain Water & Power Company, operating a hydro-electric plant at Potter Valley, Mendocino County, and electric transmission and distribution lines in Mendocino, Sonoma and Napa Counties. The Pacific Gas and Electric Company proposes to issue to the stockholders of the Snow Mountain company 26,913⅓ shares of common capital stock of a total par value of $672,833.33 in payment for the outstanding stock of that company.

Puget Sound Company's Report Shows Revenue Increase—A net operating revenue of $514,437 and gross earnings of $1,282,561 are shown by the report for July, 1929, of the Puget Sound Power & Light Company, Seattle, as against a net operating revenue of $493,211 and gross earnings of $1,189,387 during July, 1928. The net figure in both instances is arrived at after operating costs, maintenance, depreciation of equipment, and taxes are deducted. For the year ending July 31, 1929, the company showed gross earnings of $15,810,406, as compared with $15,019,862 in the twelve months preceding. While the net operating revenue during the twelve months ending July 31, 1929, was but $6,576,826 as against $6,627,903, other income brought the figure above that for 1928.

Pacific Coast Electrical Association

San Francisco Conclave of Engineering Section a Series of Strictly Business Sessions

THE success of the Engineering Section group meetings held at the Clift Hotel in San Francisco Sept. 18-20 served to emphasize the advantage of holding the first session of the fiscal year in San Francisco. Strictly business sessions were the order of the conclave, a fact made possible by the efforts of the Engineering Section to organize itself for this year's work at the close of last year's term.

Each committee confined its sessions to one day's time, thus permitting delegates to attend the sessions of various committees whose work might be of value to the company represented.

Two features in particular marked this conclave. One of them was the attendance of Major H. S. Bennion, N.E.L.A. director of engineering, who not only contributed to the various committee sessions, but who gave a most illuminating talk on certain important features of utility activity at a general luncheon gathering. The other feature was the holding of a joint session between the Engineering Section and the Purchasing and Stores Section for the discussion of common problems and also the participation of the Engineering Section in the contemporary meeting of the Transportation Section. These co-operative efforts met with general approval and are to be continued.

Brief outlines of the activities of the various committees follow:

Electrical Apparatus Committee

H. L. SAMPSON,

Southern California Edison Company, Chairman.

Only four subjects: (1) Utilization equipment; (2) transformers and regulators; (3) control equipment and layout; and (4) condensers, are at present on the program for study during the coming year.

The first subject was carried over from last year and is particularly directed toward a settlement of allowable starting current values for motors of more than 40-hp. rating. The committee decided to recommend that until an agreement with the manufacturers is reached, utility companies should permit the operation of motors, the starting current of which exceeds by 25 per cent the current value as laid down by the N.E.L.A. in 1929.

Operating experience will be the viewpoint from which the study of transformers and regulators will be followed. Troubles of various kinds as experienced by member companies and the means used to correct these troubles indicate that there are many possible improvements in mechanical and structural details which should be encouraged. The question as to just what constitutes a safe "acid content" of transformer oil aroused considerable discussion and a certain difference of opinion.

The study of control equipment and layout is a new one, but discussion at the San Francisco meeting indicates a wide interest in the various types and styles of construction used by different member companies. The use of lead-covered control cables to overcome rusty conduit and wet-wire trouble seems to be common to all companies. Methods of installation, however, seem to differ.

Discussion of various methods of charging storage batteries showed a majority to be using small motor-generator sets or trickle chargers. However, there seems to be a demand for charging equipment falling in a class intermediate between these two exremes.

The study of the subject of condensers is expected to be enlarged to include not only synchronous condensers but also generators. This study will be pursued from an operating viewpoint and with the aim of contributing to the improvement of design details to eliminate certain present mechanical and electrical troubles. Troubles and repair procedure having to do with bearings, lubricating oil, pole collars, field coils, collecting rings and ventilating systems, all indicate possible improvement.

A final report prepared by last year's lightning arrester subcommittee was presented and accepted for subsequent publication.

Accident Prevention Committee

J. R. ROWE,

Los Angeles Gas and Electric Corporation, Chairman.

Every member company in California with one exception was represented at the sessions of the accident prevention committee. A review of the committee membership revealed two interesting facts: First, that for the first time a regular member of the committee comes from one of the manufacturing companies and second that the recent appointment of a full-time safety supervisor for The Southern Sierras Power Company makes nearly a 100 per cent record for California utilities in the employment of full-time men actively following accident prevention and safety-first activity.

Two subjects carried over from last year had to do with the prevention and cure of poison oak and a study of treatment for poisonous snake bites. Reports showed that "North American snake bite serum" as now used extensively by one California utility is proving successful.

Other subjects occupying the time of the committee included (1) standardized first-aid practice, (2) preparation of a first-aid manual that is being written with the expectation of its use as a national standard, (3) safe practices to be followed in working in close proximity to energized high-voltage apparatus, (4) safe practices to be followed in dismantling old poles, (5) safe and unsafe methods of grounding practice and grounding devices, (6) development and use of safety clothing such as rubber sleeves, safety shoes, etc., (7) unusual accidents involving common hazards, (8) discussion of resuscitation including Insull medal awards and applications therefor, (9) discussion of recent national safety publication and participation in the national fall group meeting.

Hydraulic Power Committee

CLINTON DeWITT,

Pacific Gas and Electric Company, Chairman.

Studies undertaken by the hydraulic power committee include five subjects continued from last year and three new subjects.

The study of flow-line conduits continues a work started last year and will cover flow-line tunnels and pipes together with their appurtenant structures. Further study of the use of concrete in hydraulic structures follows work pursued last year and will cover the use of admixtures in concrete and plant layout for bench flume and canal lining. Mechanical reliability of hydro-electric plants as a subject of study is to be continued.

A study of current research and practice in hydro development bids fair to uncover some new and interesting information from an engineerinig standpoint and this year's study of the subject is intended to bring previous reports up to date. Hydraulic plant operating problems also are continued as a study subject in the nature of a discussion forum concerning matters of interest to operating and designing engineers.

Automatic frequency control is a matter of particular interest at this time since most operating companies are confronted with this problem at the present time. Published data on the subject is extremely limited and it is hoped that this committee's study of the subject will result in the publication of useful information. Isolated installations of safety features and equipment on hydraulic conduits, forebays and other unattended structures will be studied.

It is intended to study the subject of maintenance of hydraulic structures from a practical and economic standpoint, to outline maintenance problems and to give information concerning the life of various types of structures and data which may result in design improvement from a maintenance standpoint.

Inductive Co-ordination Committee

H. S. LANE,

Pacific Gas and Electric Company, Chairman.

The inductive co-ordination committee is divided into four subcommittees corresponding to the four study subjects of the year's program. Each subcommittee has representation from all of the various member companies, including the communication companies. The close co-operation between communication and power representatives in pursuing the work of this committee is believed to have been of definite value to all parties concerned. The four subcommittees will study, respectively, inductive co-ordination, power company communication systems, radio co-ordination and complaints, and the use of a common primary and secondary grounded neutral.

Published material from the N.E.L.A. inductive co-ordination committee, the national joint D.R. committee, and from the foreign wire relations committee of the Bell Telephone System, were presented and discussed without action. A study of current cases of parallelism in the West was considered to be economically unjustified. Questions concerning the relative importance of open wire and cable exposures and fault currents in electric distribution lines were discussed without action. A proposed study of wave form and its relation to power apparatus design and application was discussed and considered to be economically unjustified.

The work of the subcommittee studying power company communication systems will cover the general requirements and operating problems of such systems, the extent and character of private communication systems, special equipment and methods, problems of signaling, operating methods, testings, records and related subjects. The problem of selective signaling received special consideration.

Concerning radio co-ordination, preliminary reports were submitted covering methods and equipment for tracing troubles together with classifications of complaints and costs. G. H. Curtiss, of the Pacific Radio Trades Association, described the co-operative plan in effect in the San Francisco Bay area and distributed samples of the forms used. Major Bennion, of N.E.L.A. headquarters, commented upon the situation elsewhere in the country and Mr. Mess explained the attitude which the California Railroad Commission will take in connection with recent legislation on this subject.

The study of questions involved in the use of common primary and secondary grounded neutrals at present are in the experimental stage with certain "test areas" under observation.

Meter Committee

J. C. ABEL,

Pacific Gas and Electric Company, Chairman.

Educational efforts conducted under the direction of the meter committee was the opening subject for discussion at the San Francisco meeting. In last year's meter courses conducted at the University of California, Berkeley, it was reported that ten members were enrolled in Class A and twelve in Class B. For similar courses held at the California Institute of Technology, Pasadena, and at the University of Arizona, Tucson, the attendance was respectively 44 and 26. Plans for the 1930 meter school are in the course of preparation but are not yet completed.

A study of meter statistics will be carried on largely as hertofore with an elaboration of data as received from various companies. New developments in electric meters are to be closely followed by the committee. European metering and instrument practice was interestingly described by O. A. Knopp of the Pacific Gas and Electric Company, who recently spent several months in Europe.

A study of the application of 5-amp. meters to modern lighting loads indicated that information available shows little revenue loss through the use of small meters. However, this study is to be pursued further. Tests on current transformer meters are to be carried on in the near future and data made available through these tests will be presented at subsequent meetings.

An illustrated lecture covering the stroboscopic method of watt-hour meter testing was presented by J. E. Bridges of the Westinghouse Electric & Manufacturing Company. Other subjects being given time and consideration by the meter committee include: (1) Operating problems of meter departments, (2) watt-hour meter testing problems, (3) meter test facilities, (4) remote totalizing metering with indicating and recording instruments, (5) relay tests and investigations, and (6) special tests and investigations.

Overhead Systems Committee

F. E. DELLINGER,

Los Angeles Gas and Electric Corporation, Chairman.

The work of the overhead systems committee has been subdivided into eight study subjects, six of which were carried over from last year. In addition to the study of these general subjects a joint subcommittee is working with the inductive co-ordination committee following the development of the study on the common neutral investigation as being carried on under the trial practice agreement between the power and communication companies.

Tests started by last year's committee which studied the question of transformer loading and methods of determining such loads are to be followed further this year. The committee's work on the National Electrical Code which was started last year also is being pursued further in the hope that definite recommendations as to revision may be made during the current year.

Joint pole practice and construction rules again are being studied with the idea of bringing to the notice of the committee any new developments along these lines. One of the livest present subjects concerns methods of securing satisfactory grounds, and the committee is planning to make tests and detailed studies which it is hoped will reveal information of value which may be added to the findings of last year's committee. A study of pole line structures and devices apparently is to be limited largely to wood poles in an effort to uncover new and useful information.

One of the committee's new studies conserns operating records and it is hoped that data concerning circuit interruptions on circuits of 6,000 volts and above may be compiled, through which means it will be possible to compute the kilowatt-hour power losses due to interruption. With these definite data it is expected that a basis may be developed through which it may be determined to what extent expenses are justified to prevent such interruption.

The study of the subject of corrosion of metals is being extended to include transformer cases and metal switch gear and also to follow the development of protective and preventive measures which now are being tried out in some localities.

Conductor vibration is another new subject and it is to be pursued to determine data concerning circuit outages caused by conductor "whipping" due to wind and other causes.

Prime Movers Committee

H. S. MARKEY,

Great Western Power Company of California, Chairman.

The study subjects undertaken by the prime movers committee for the 1929-30 season include: (1) Review, (2) heat balance, (3) maintenance and operation, (4) boiler water and condenser water, (5) turbine-generator equipment, and (6) automatic control equipment.

It is intended that the review subcommittee shall be familiar with the work of past committees which have studied subjects on which there have been subsequent developments of material importance and also that it shall function to attempt to bring to light the problems most desirable for further study by other subcommittees. The heat balance subcommittee has been asked to analyze the heat balance of various Pacific Coast plants, in an attempt to determine the actual reason for the differences in plant performance, the relative value of each piece of major equipment, etc.

The maintenance subcommittee is to study the subject of maintenance costs of various pieces of equipment under various load conditions. Whether thus study shall be based upon actual or relative costs is yet to be determined. The main problem to be considered in connection with boiler and condenser water is that having to do with the carry-over of solids from boiler to turbine, resulting in a deposit on turbine blades.

One of the topics to be studied by the turbine-generator equipment subcommittee probably will be the interesting features involved in the 1,200-lb. turbine installation of the Pacific Gas and Electric Company. Studies of automatic control equipment probably will be limited to the equipment involved in automatic feed water regulation and automatic combustion control.

Underground Systems Committee

R. P. LUTZI,

Pacific Gas and Electric Company, Chairman.

Eleven different subjects were presented by various subcommittees and most of them aroused constructive discussion. These subjects are touched upon only briefly in the following outline:

In connection with the problem of lowering underground transformer losses instead of ventilating transformer manholes and vaults, it appears that such a trend will assist in reducing temperatures in vaults and will permit appreciable additional capacity in vaults and manholes where it is impractical to install forced ventilation.

From information presented it was determined that very little non-leaded cable is in use by Pacific Coast companies. The study of leaded versus non-leaded cable is to be pursued further. The subject of standby service was discussed without recommendations.

An effort to determine the advantages, if any, in using 6.6, 15, or 20 amp. in street lighting circuits brought the conclusion that there are no outstanding operating advantages one way or the other, the question being purely one of application. Initial investigation into the possible use of parkway cable for distribution, as reported upon, showed that such cable now is used almost exclusively for street light circuits, where it is used at all. Most companies seem to use standard duct systems for distribution.

Underground equipment submersion for long periods of time is avoided by all companies responding to inquiries on this matter. Short-time complete immersions and longer-time partial immersions seem to be tolerated with reasonable success.

Discussion of different methods of locating faults in underground cables indicated a general use of the "tone" method, particularly for low-resistance faults. Other methods were described briefly.

Pulling stresses in cables as affected by duct characteristics and construction methods are to be investigated thoroughly by a subcommittee. The possible undesirable effects of stray sheath currents upon load readings taken by means of split-core transformers aroused spirited discussion and will be further studied. A "network" distribution system as applied to two large San Francisco buildings and the adjacent areas was described.

Commercial Section to Hold Conclave Oct. 3-4

A call for the first conclave of the new association year to be held by the Commercial Section, P.C.E.A., has been issued by G. T. Bigelow, chairman. The meeting will be held in the Alexandria Hotel, Los Angeles, Oct. 3-4.

Speakers at the general sessions on Thursday, Oct. 3, will include W. L. Frost, past president, P.C.E.A.; C. E. Houston, of the executive committee, Commercial Section, N.E.L.A., who will report on the recent Chicago meeting; H. C. Rice, manager of the merchandising department, Southern California Edison Company, who will discuss the proposed wiring code; and E. B. Criddle, president, P.C.E.A. A. M. Frost, vice-president, P.C.E.A., is scheduled to talk at the luncheon on Thursday.

At the general session on Friday afternoon reports of progress will be made by bureau chairmen, and a prominent speaker, whose name has not been announced, will address the meeting bringing outside views to the commercial men of the industry.

Advertising-Publicity Men to Meet October 4

Coincident with the meeting of the Commercial Section, P.C.E.A., the Advertising-Publicity Section of the association will hold its first conclave of the association year at the Hotel Alexandria, Los Angeles, on Oct. 4.

The meeting will convene at 9:30 a.m., and members have been urged by George C. Tenney, chairman of the section, to bring with them samples of their newspaper and direct-mail copy in order that these may be exhibited in connection with a discussion of the relative merits of various media for merchandise advertising.

Purchasing & Stores Section Plans Year's Work

Meeting in the Pacific Gas and Electric Building, San Francisco, Sept. 19-20, the Purchasing and Stores Section, P.C.E.A., completed its committee organization and personnel assignment and got under way for its current year's work. Among the subjects to be given particular attention during the coming year are: Purchasing department organization and procedure, surplus and obsolete material, stores department organization, material control, and simplification of stores accounting.

Perhaps one of the most interesting and important activities undertaken by the Purchasing and Stones Section was an all-day joint meeting on Sept. 20 with the Engineering Section, then in session at the Clift Hotel, San Francisco. The object of this joint meeting was to promote a common study on subjects of mutual interest to the two sections through the efforts of a joint committee. It was realized that the province of equipment and material standardization from a utilization standpoint logically falls within the jurisdiction of the Engineering Section. However, since the purchasing and stores department of a utility must purchase and warehouse all of this material, the consensus of opinion of the joint meeting was to the effect that there was, indeed, a community of interest which best could be served through co-operative efforts between the two sections. Details of actual co-operative procedure remain to be worked out, but the start has been made.

Transportation Section Has Four Working Divisions

The Transportation Section, P.C.E.A., held its first series of meetings at the Sir Francis Drake Hotel, San Francisco, Sept. 18-19. The section meetings were held at that time in order to permit co-operative activity with the Engineering Section and with the Purchasing and Stores Section.

Activities of the Transportation Section have been divided into four major groups or divisions: Organization, technical, accounting and maintenance. Various committees dealing with subjects pertinent to the interests of the various divisions have been organized within each division.

The organization division (S. B. Shaw, Pacific Gas and Electric Company, chairman) will handle matters pertaining to personnel and regulation, educational activities and legislative matters, with committees appointed to deal with each one of these subjects. Under the supervision of the Technical Division (E.C. Wood, Pacific Gas and Electric Company, chairman) come committees studying vehicles, power devices, building, and power tools. It is contemplated that the accounting division (J. M. Wainscoat, San Joaquin Light & Power Corporation, chairman) will keep in touch with and thoroughly analyze maintenance and operation costs having to do with utility transportation departments. The maintenance division (V. W. Dennis, The Pacific Telephone and Telegraph Company, chairman) has committees which will study, respectively, repairs, materials, accessories and appearance of equipment.

It is the particular aim of the executive officers of the Transportation Section to co-operate to the fullest possible extent with other sections of the P.C.E.A. in order that utility transportation service, as influenced by the section, may serve the best interests of the other utility departments affected.

Tentative plans call for the next Transportation Section meeting to be held at San Diego Dec. 5-6, 1929.

Meetings

Coming Events

National Electrical Wholesalers Association, Pacific Division—Quarterly convention, Hotel Del Monte, Del Monte, Calif., Oct. 3-5, 1929.

Pacific Coast Electrical Association—First Commercial Section conclave, Alexandria Hotel, Los Angeles, Oct. 3-4, 1929.

Advertising-Publicity Section — Meeting at Alexandria Hotel, Los Angeles, Oct. 4.

World Engineering Congress — Tokio, Japan, beginning Oct. 30, 1929.

State Motor Section Draws Report

Ending a day crowded with individual reports and discussion, the Motor Section, California Electragists, Northern and Southern Chapters, in its second statewide meeting correlated into one paper the subjects it desired brought up before manufacturers of motors and motor equipment at the convention of the A.E.I. at Swampscott, Mass. Thirty motor specialists representing a total of 50 of the most substantial motor dealers in the state, both north and south of the Tehachapi and the San Joaquin Valley, deliberated on the subjects included in this report and recommendation to manufacturers and in unanimous resolutions authorized its committee to proceed.

The subjects covered in the report deal with suggested policy as regards sales to Class A and Class B industrial customers, a revision of discounts on all classes of equipment and more strict definition of Class D franchise holders. Full text of this report will be found on pages 202-3 of this issue.

The correlating committee set up by chairman H. Adams consisted of the following: F. O. Sievers, Coney & Kuchel Electric Co., San Francisco, and acting chairman of the National Motor Section; K. M. Noble and L. A. Douat, Buzzell Electric Works, San Francisco; S. S. Rice, Quality Electric Motor Company, Oakland; Frank Boyd, Pacific Electric Motor Company, Oakland; L. H. Ellet, Quality Eectric Works, Los Angeles; and Joe Rendler, Motor Machinery & Supply Company, Los Angeles.

Papers read in the meeting and from which the final report was drawn were: "Discounts on Fractional Horsepower Motors," by K. M. Noble; "General Discount Classifications," by H. O. Sievers; "Activities of Manufacturers in Class A Trade," by L. A. Douat, Buzzell Electric Works, and Frank Cole, Enterprise Electric Works, San Francisco; "The Southern Division Motor Section's Recommendations," by Frank Connolly, secretary, Southern Chapter, California Electragists; "Manufacturers' Policy on Repairs," by S. S. Rice; "Repair Part Discounts," by F. S. Boyd, read by Walter Vance.

Following the all-day business session the San Francisco motor dealers tendered their guests from other parts of the state and motor manufacturers' representatives a banquet and entertainment.

A.I.E.E. President Guest of Utah Section

Harold B. Smith, president of the American Institute of Electrical Engineers, was the principal speaker at a meeting of the Utah Section of the Institute in Salt Lake City on the evening of Sept. 9. Dr. Smith discussed recent transformer designs, including one perfected to handle voltage exceeding 1,000,000 volts. He used lantern slides to illustrate his talk.

Dr. Smith, who arrived in Salt Lake City en route from the A.I.E.E. Pacific Coast convention at Santa Monica, Calif., was the guest of honor of the Utah Section at a dinner preceding his address. It is his announced intention to visit personally every section of the Institute during his term of office, and he has made the recent convention an opportunity to be present at section meetings throughout the Pacific Coast territory.

Pacific Division, N.E.W.A., Will Convene in Del Monte—Announcement has been made by Albert H. Elliot, secretary, that the quarterly convention of the Pacific Division, National Electrical Wholesalers Association, will be held at the Hotel Del Monte, Del Monte, Calif, Oct. 3-5. An interesting program is promised.

Contractors, Dealers and Inspectors

Northwest Electrical Inspectors' Convention Discusses "Cheap" Wiring

FEATURED by the presence of several figures of national prominence in the inspection branch of the electrical industry, by inspirational addresses from two deans among inspectors in the United States, by discussion-provoking papers and committee reports, and by entertainment features of particular appeal, the fourth annual convention of the Northwest Section, International Association of Electrical Inspectors, at Vancouver, B. C., Sept. 9-11, 1929, passed into history as the most profitable meeting of the organization to date.

J. C. Forsyth, president, I.A.E.I., New York, and W. S. Boyd, secretary of the Western Section, Chicago, brought the responsibility of the inspectors to the industry and to themselves forcibly before the delegates, while the subjects eliciting the most discussion were: "Is Cheaper Wiring Necessary or Desirable?" presented by Major H. S. Bennion, director of engineering, N.E.L.A., New York; "Grounding," by Dr. M. G. Lloyd, chief, Section of Safety Engineerinfi, U. S. Bureau of Standards, Washington, D. C.; "Armored Cables," by A. Penn Denton, engineer, N.E.M.A., New York; and "Reinspection," by R. L. Laing, fire marshal, Seattle. The report of the Code Clearinghouse Committee, recommending minimum wattage requirements for different sized rooms and different occupancies, with a view to making the national code provide a minimum standard of adequacy, was hailed as the most constructive piece of code criticism yet to be produced by a geographic section of the association.

Officers elected at the final business session for the ensuing year were: president—C. H. Fletcher, chief electrical inspector, Vancouver, B. C.; vice-president—C. B. Gleason, chief electrical inspector, Tacoma; and secretary-treasurer—F. D. Webber, electrical engineer, Oregon Insurance Rating Bureau, Portland. Additional members of the executive committee were chosen as follows: William Myers, electrical inspector, State Bureau of Labor, Salem, Ore.; H. S. Jenkins, electrical inspector, Bellingham, Wash.; S. B. Clark, Northwestern Electric Company, Portland; J. H. Sroufe, Jaggar-Sroufe Company, Portland; and C. E. Carey, Westinghouse Electric & Manufacturing Company, Seattle. H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle, L. W. Going, chief electrical inspector, Portland, and F. D. Webber were elected to represent the section on the international executive council.

Bellingham, Wash., offered to act as host to the next convention, a matter referred to the executive committee for future action.

A resume of the addresses, papers and discussions follows.

A hearty welcome to Vancouver was extended by Alderman E. W. Dean, acting mayor. Seconding this welcome, W. G. Murrin, president, B. C. Electric Railway Company, Vancouver, called attention to the responsibilities of the inspector as being to safeguard the public and assist in the development of the use of electrical energy so that the public could enjoy the benefits of electrification to the fullest. Responding for the International Association, J. C. Forsyth, president, urged a wholehearted co-operation with the purposes of the association, while L. W. Going, chief electrical inspector, Portland, voiced the sentiment of the Northwest Section as centering around a desire to standardize wiring codes and practices. In the annual president's report, H. A. Patton made a plea for the universal adoption of the National Electric Code and for the shaping of that code into acceptable form instead of making local rules for each individual municipality.

Reciting an impressive array of wiring abuses and misuses of electrical equipment after the original installation had been approved, R. L. Laing, fire marshal, Seattle, urged the necessity of frequent re-inspection. Tampering with fuses, overloading circuits, and extending circuits by means of lamp cord, he stated were the most common abuses introducing hazards. He concluded with the statement that lack of an adequate original installation was responsible for most of the illegal extensions to circuits.

In an erudite study of the general subject of grounding, M. G. Lloyd, U.S. Bureau of Standards, Washington, D. C., defined the term, gave reasons for its application, described various methods used, and discussed the grounding of non-current-carrying parts. Among his conclusions were the contentions that because of the recognized advantage to the public, grounding should be made compulsory; that ground wires should be protected from mechanical injury; that current-carrying capacity should be determined by the current rating of the nearest cutout that would operate to break the circuit in case of accident to insulation; and that ground connections should be inspected at least once a year. In a prepared discussion, S. B. Clark, Northwestern Electric Company, Portland, questioned the desirability of including rules for grounding non-current-carrying parts in the code, since this practice depends for safety on unknown factors. He expressed the belief that multiple grounding might be applied to interior wiring in buildings, contending that there would be small tendency for ground currents to take a definitely harmful path but that they would naturally distribute themselves over the multiple grounds.

The developments in the manufacture of armored cable leading up to the new standard of armored bushed cable were described in a paper by A. Penn Denton, N.E.M.A., New York, and read in his absence by W. J. Canada, director of engineering of that organization. The fiber bushing inserted into the new A.B.C. type between the armor and the insulation is designed to prevent the cutting of the insulation by sharp points of armor at points of cutting the cable, and the new type of spirally-wound fibrous insulation is easier to remove without damage than the old braided type of insulation. He brought out other comparisons of the new with the old to show how the principal objections to the old had been overcome. A spirited discussion followed in which it seemed definitely established that contractors do not like to use the old type of cable and that this type had been responsible for many fires. Practically all the faults inherent in the old type cable or attendant upon its installation were recited and hope was expressed that the new type would actually eliminate the trouble experienced with the old, there being a prevalent feeling among those discussing the subject that this type of wiring had a definite place in the picture.

Describing the duties of the field engineer of the N.F.P.A. as consisting in the interpretation of code changes to the inspectors in the field, and acting as the messenger of the field inspectors

Electragists Convene at Bakersfield

Bakersfield will play host to the California Electragists' annual state convention on Oct. 19. The meeting, which will be confined to the day only and for contractor-dealers only, has been programmed to cover discussions of the following subjects: Class A contracting, bungalow and apartment house problems, Motor Section progress, merchandising problems, credit control report, a report of the activities at the Swampscott convention of the A.E.I., and organization policies.

Ladies will be entertained by the Bakersfield ladies during the day and after the business session an informal dinner and dance will be held. Full details of arrangements are being sent out to all members and contractors in the entire state.

for their recommendations to the Electrical Committee, V. H. Tousley, holding that position, stated that the N.E.C. should be a code of the inspectors on the firing line, not of the Electrical Committee. He stated that it was hoped that through the formation of the international association every inspector could be made a part of the code-making body of the country.

In a clear-cut inspirational message to the inspectors J. C. Forsyth, president, I.A.E.I., elaborated the aims and purposes set out in the articles of association of the international organization, pointing out the full responsibility of the inspector to the public, to the insurance interests, to the electrical industry and to himself. In it the inspector was shown as the watch dog for the public and the helpmate of the industry, having a large influence on the economic betterment of mankind. He bespoke the co-operation of the geographic sections with the international association to the end that the high purpose of the organization might be realized to the ultimate benefit of all.

Further inspiration was found in the address of W. S. Boyd, secretary, Western Section, I.A.E.I., entitled "The Dreamer," in which the prominent place in the advancement of civilization taken by those who had dreamed and made their dreams come true was told. He urged those making inspection their life work to stop occasionally in the midst of their daily rush of business and take time to think and dream of larger things and higher ideals.

In his discussion of the subject, "Is Cheaper Wiring Necessary or Desirable?" Major H. S. Bennion, engineering director, N.E.L.A., defined cheapness as low cost without shoddiness, and with no sacrifice of safety. As between more expensive wiring and less of it on the one hand, and less expensive wiring and more of it on the other, he contended that the contractor would be as well off with the one as with the other with a slight advantage in favor of the less expensive type of wiring with more of it, because of the greater amount of labor involved in the installation of more material. The manufacturer would sell about the same value of goods in either case, while the inspector would benefit from the less-expensive-and-more-of-it type because most troubles come from illegal extension of inadequate jobs. He told of experiments being tried with new types of concentric wiring, use of bare neutral, and other means of making adequate jobs cost less to the wage earning home owner, and made a plea for open mindedness with regard to any developments that might be brought out that might induce the owner to wire more completely so as to be able to enjoy the benefits of the fullest use of electric service.

Discussion brought out considerable opposition to "cheap" wiring, it being contended that proper salesmanship would sell one of the accepted types of wiring now in general use. Thought on the subject was crystalized in the remarks of Dana Pierce, president, Underwriters' Laboratories, Inc., Chicago, when he called attention to the fact that **cheap** wiring does not necessarily mean **unsafe** wiring, but that in the current discussion **cheap** wiring meant low-cost **safe** wiring. He pointed out that experimentation has never led the way in the determination of wiring standards, but has followed the appearance on the market of materials or devices offered by manufacturers, and he emphasized the desirability of maintaining an open mind toward experimentation with any new types of wiring materials that might be so offered.

Legislation by municipalities and states, looking toward the establishment of codes and the control of their administration, was the subject of a talk by Harry B. Kirkland, Society for Electrical Development, New York. He cited many instances in which the uniform ordinance department of the Society, of which he is the head, had been of service to governmental bodies in the preparation of ordinances and enabling acts, and described in particular the uniform ordinance developed by his department.

The step-by-step methods by which standards are developed at Underwriters' Laboratories were described in detail by Mr. Pierce. Carrying the process from the examination of a single article of a single manufacturer, on through further examination of similar articles of other manufacturers, to a meeting of the manufacturers, with the subsequent submission of the question through the appropriate committee of the N.E.M.A. to an industry conference where the standards were agreed upon, thence to the ultimate submission of the agreed standards to the American Standards Association for approval, he showed that the standards are not, therefore, the product of a few laboratory engineers, but actually represent a large co-operative development. He illustrated the process with examples from actual experience in radio, motors, oil burners, armored cable and other materials and devices. He urged that inspectors furnish experience records from the field, stating that this practice would improve the service and methods of the Laboratories.

Outstanding among the committee reports submitted for discussion and action at various stages of the meeting was the report of the code clearing-house committee referred to earlier. Among many suggested revisions of the N.E.C. recommended by the report, which was presented by L. W. Going, chairman of the committee, those revisions pertaining to adequacy of circuits based on minimum wattage requirements for different occupancies and different sizes were considered the most constructively beneficial. Without adverse discussion, the report was approved by the convention with the recommendation that it be brought through proper channels before the Electrical Committee.

The report of the range wiring committee, presented by A. M. McLean, electrical inspector, Portland, recommended a method of combining a range installation with existing lighting and appliance branch circuits in a dwelling, and presented a set of minimum requirements for the installation.

Adequate Codes Sought by Inspectors at Southwest Convention

EVEN after devoting three and one-half days to addresses from national officers and important leaders in inspection activities from the East, reports of committees and discussion of inspection problems, the sixth annual meeting of the Southwestern Section, International Association of Electrical Inspectors, formerly known as the California Association of Electrical Inspectors, closed leaving the 100 odd members who attended wishing there were more time to continue the discussion of their problems.

The meeting was distinguished by the number of national figures present at the convention. On the program were Joseph C. Forsyth, president, I.A.E.I., New York City; J. S. Mahan, chairman, membership committee, Chicago; William F. Boyd, secretary and first vice-president, Chicago; Dr. Morton G. Lloyd, chief, section of safety engineering, Bureau of Standards, Washington, D. C.; Dana Pierce, president, Underwriters' Laboratories, Chicago; Victor H. Tousley, electrical field engineer, N.F.P.A., Chicago. Besides these men, on the program were W. J. Canada, former field engineer, N.F.P.A., and now representing the N.E.M.A., and Harry Kirkland, in charge of the division of codes and ordinances, Society for Electrical Development, New York City. H. A. Patton, Seattle, president of the Northwestern Section, also attended.

Mr. Forsyth was the first speaker, telling of the aims and the purposes of the I.A.E.I. (See report of Northwest section meeting.) He was followed by Mr. Mahan who predicted a membership of 3,500 within the year.

William F. Boyd departed from the address he gave at the Northwest Section and reviewed the history of regulation in a scholarly paper entitled "Chickens Come Home to Roost." He pointed out that experience had shown defective or inadequate wiring to restrict central station service and market development. He declared it inevitable that history would repeat itself unless wiring is made adequate, re-

liable and safe. His paper ended with the quotation of what he called "the twenty-third electrical psalm."

Harold L. Gerber, department of electricity, San Francisco, next gave an informal talk on the new developments in electricity which make wiring codes inadequate to take care of the new situation thus created. He cited instances of code inadequacy in panelboard regulations where heater circuits are involved. He predicted greater use of radioactive circuits in future installations and more extensive use of three-phase four-wire circuits than at present. Neon lighting has discovered new difficulties because its power factor under test has been found to run from 8 to 50 per cent, requiring that circuits be rated in volt-amperes rather than watts.

The first afternoon session ended dramatically in a very graphic and impressive demonstration of first-aid and artificial respiration for resuscitation from electrical shock conducted by S. C. Dickinson, safety supervisor, Pacific Gas and Electric Company, San Francisco.

Opening the Thursday morning session Herbert W. Stitt, field representative, California Electrical Bureau, in a talk entitled "Some Observations of a Former Electrical Inspector," described conditions he has found since affiliation with the Bureau in rural districts where no inspection exists and in small communities where inspection is done by the fire chief. He described the work of the Bureau in assisting in the establishment of ordinances and also in the uniform interpretation of the code.

A significant statement he made was "the per cent of your local ordinance which is a National Electrical Code is the per cent that will stand in court. Can you say as much for your local rules?" He cited the power companies' kilowatt-hour contests which give rise to greater need for copper capacity in home wiring than ever before. The extensive use of small heating appliances of up to 2,000-watt capacity on convenience outlet circuits was pointed to as requiring greater consideration of adequacy in ordinances and in the code.

In discussing "The Domestic Load (of the power companies) and Some of Its Problems," H. C. Rice, merchandising department manager, Southern California Edison Company, Los Angeles, took as his text, "Thou Shalt Neither Vex a Stranger, Nor Oppress Him." He elaborated upon this to show the difficulties placed in the way of the home builder by two rigid requirements and lack of uniformity in codes and ordinances. He cautioned against setting up factors of safety out of all proportion to the risk involved and asked the question, "If we increase the cost of electric wiring by requiring excessive protective devices and expensive material, which in turn demand a high labor cost for their installation, is there not a possibility that the consumer, to escape this expense, will resort to schemes and devices which increase his electrical hazard? Is not the object of safety defeated, rather than aided, by a system which makes it difficult for the customer to use the desired appliances in a safe, sane and inexpensive manner?"

Dana Pierce, for many years chairman of the Electrical Committee of the N.F.P.A., the code-making body, described the time when the Pacific Coast was remote in the minds of the electrical committee and declared that condition now changed.

The afternoon session opened with an illustrated talk by Dr. Morton G. Lloyd on the electrical work of the Bureau of Standards. He described the equipment and the methods by which standard units of measurement are derived and tests conducted on materials for the writing of specifications for government and other purchases.

This was followed by an informal discussion of inspectors' problems with R. H. Manahan, chief, department of electricity, Los Angeles, in the chair.

A tour of the Fox Theater conducted by Ralph W. Wiley and Harold L. Gerber, started the morning session Friday. This was followed by a talk, illustrated by samples of the equipment, on the traffic control problems of San Francisco. Ralph W. Wiley, chief, Department of Electricity, and investor of the system, described it in detail. Following this an informal discussion of transformer vault drainage problems and other similar problems was carried on.

The Friday afternoon session opened with a talk by Victor H. Tousley on the recent changes or amendments to the National Electrical Code. These he said were to be found largely in the provisions for grounding in which the 1929 code would revert to the 1925 rules. A more logical grouping of the grounding rules together instead of in separated paragraphs would be found in the new edition, he said.

There followed a warm general discussion in which the subject of committee work was broached. In an extemporaneous and spontaneous talk, Dana Pierce administered one of the finest rebukes to committeemen who, by their inaction, destroy the work of an assocation, that has ever been heard in a local association meeting. (The ful ltext of this talk, it is planned, will be published in a future issue of "Electrical West.")

The new Red Seal certified standards of the California Electrical Bureau for the wiring of commercial buildings were given the unanimous endorsement of the section. The convention proper closed with resolutions and election of officers. Pasadena was chosen as the next meeting place by a committee consisting of R. H. Manahan, Los Angeles, K. J. Bickel, Martinez, and H. V. Dobson, Santa Barbara. The following officers were elected for the coming year: president—A. E. Johnstone, San Diego; vice-president—E. H. Snedaker, San Jose; secretary and treasurer—C. W. Mitchell, San Francisco. On the executive committee, besides the officers, were named Carl Beaton, Sacramento; H. N. Beecher, Los Angeles; R. H. Cates, Southern California Edison Company, Los Angeles; and E. E. Browne, manager, San Francisco Contractors and Dealers Association. C. W. Mitchell and George B. Kimball were each elected for a three-year term on the executive council of the I.A.E.I.

Convention committees included: nominating—G. B. Kimball, San Francisco, James Dixon, Santa Clara, and D. H. Alexander, Long Beach; resolutions—J. M. Evans, Los Angeles, chairman, H. N. Beecher, Los Angeles, and Ben Hill, Oakland. M. A. DeLew, Associated Oil Company, had charge of the ladies' entertainment.

On Saturday morning most of the delegates remained to make an inspection of the Underwriters' Laboratories branch at San Francisco, conducted by R. J. Larrabee, engineer in charge.

Important visitors and officials of the Northwest Section, I.A.E.I., at Vancouver. *Left to right*, W. J. Canada, N.E.M.A., New York; Harry B. Kirkland, S.E.D., New York; J. C. Forsyth, president, I.A.E.I., New York; V. H. Tousley, N.F.P.A., New York; the representative of Ontario hydro commission, Toronto; W. S. Boyd, Western Section, I.A.E.I., Chicago; J. Mahan, I.A.E.I., Chicago; H. A. Patton, president, Northwest Section, Seattle; L. W. Going, former president, Northwest Section, Portland; H. F. Jenkins, former president, Bellingham, Wash.; C. H. Fletcher, newly elected president, Northwest Section, Vancouver, B. C.; and A. M. McLean, electrical inspector of Portland.

Personals

San Jose Division Manager Appointed by P. G. and E.

FOLLOWING a 20-year period of service as division manager for the Pacific Gas and Electric Company, with headquarters at Chico, Calif., I. B. Adams has been appointed manager of the company's San Jose division, with headquarters in that city. He succeeds the late John D. Kuster.

Mr. Adams has been associated with the gas and electric business in California for the last 30 years. He entered the field in the electrical construction department of the Yuba Electric Company, and when that company was absorbed by the Bay Counties Power Company he continued with the latter. He then joined the organization of the Valley Counties Power Company which, with the Bay Counties company, was in turn merged with the California Gas & Electric Company, the predecessor of the Pacific Gas and Electric Company. During the early part of his work in the northern California territory, Mr. Adams played an important part in the construction of the Yuba, Colgate and De Sabla power houses.

I. B. ADAMS

John H. Fagg, formerly division superintendent at Stockton for the Pacific Gas and Electric Company, has been transferred to Chico as division manager to succeed Mr. Adams, and **O. R. Evans,** who was the district superintendent at Santa Rosa, has been chosen to fill the office of division superintendent at Stockton.

Miss Irma Ward, of the Public Service Company of Colorado, Denver, has been appointed chairman of the women's committee, Rocky Mountain Division, N.E.L.A., succeeding Miss Francis B. Ryder, of the Southern Colorado Power Company, Pueblo.

T. H. Ness, formerly division manager of the Umpqua Division of the California Oregon Power Company, has been appointed manager of the Coos Bay division of the Mountain States Power Company, with headquarters in Marshfield, Ore. He succeeds A. L. Martin, who has been made district manager of the western Wyoming properties of the Mountain States company.

Dr. John R. Haynes has been elected president of the Board of Water and Power Commissioners of the City of Los Angeles to succeed former Judge Harlan G. Palmer, who resigned as head of the board, although retaining his membership. Mr. Palmer then was elected vice-president in place of Dr. Haynes, who had been elevated from that office, the two exchanging positions.

Robert W. Miller, executive vice-president of Pacific Lighting Corporation, has been made a member of the board of directors of the Los Angeles Gas and Electric Corporation, succeeding the late William Baurhyte.

Obituary

John Kuster of P. G. and E. Taken by Death

JOHN D. KUSTER, for many years division manager for the Pacific Gas and Electric Company, with headquarters in San Jose, Calif., died in that city Sept. 12 of double pneumonia following an illness of less than a week.

JOHN D. KUSTER

A native of Marysville, Calif., Mr. Kuster began his career in the utility field by entering the employ of the gas company there and later became manager. When that company was taken over by the Pacific Gas and Electric Company he was transferred to Colusa as manager, then to Fresno as manager of that district, and in September, 1909, to San Jose as district manager there. Later he became division manager, the position he held at the time of his death.

Aside from his regular duties, Mr. Kuster gave generously of his time to civic and organizational affairs. He was a charter member and a past president of the San Jose Rotary Club, a vice-president of the local chamber of commerce and had served several times as a member of its board of directors, and from 1917 to 1921 was a member of the city board of education.

Former Edison Co. Director Dies at Advanced Age

HENRY FISHER, Redlands, Calif., capitalist who financed the construction of the first three-phase, long distance transmission, hydro-electric plant in the Uinited States, died suddenly Sept. 6 at Santa Barbara. He was 86 years of age. His death was due to his advanced age and a heart ailment.

Mr. Fisher's business career, which included the organization of the Redlands Street Railway and the San Bernardino Valley Traction Company, began at Oil City, Pa., in 1864. He organized the Fisher Oil Company in the early years of the petroleum industry and was one of the originators of the pipe-line method of oil transportation.

In 1893 Mr. Fisher moved his home to Redlands and became identified prominently with financial affairs of the San Bernardino Valley. He became president of the Redlands Electric Light & Power Company, organized by Henry H. Sinclair, and made possible the construction in Mill Creek Canyon of the first three-phase hydro-electric plant ever built in the United States. This organization was the parent concern of the Southern California Edison Company, and Mr. Fisher continued his activities in the electrical industry of the West for many years. He was a director of the Southern California Edison Company until his retirement eight years ago, and his place on the Edison company board was taken by his son, John H. Fisher, president of the Equitable Investment Company of Los Angeles.

J. D. Blackwell, for two years city engineer of Seattle, died suddenly at his home in that city on Sept. 5, at the age of 59 years. Mr. Blackwell had been engaged in civil engineering in Seattle for twenty years, and was a former president of the Northwest Society of Engineers.

John Wallace, an electrical engineer with the Pacific Telephone and Telegraph Company, San Francisco, died suddenly in that city Sept. 13 following a heart attack.

Manufacturer & Distributor

G-E Supply Corporation's Organization Complete

Completing the organization of the General Electric Supply Corporation, a consolidation of the fourteen wholesale distributing corporations owned by the General Electric Company, announcement has been made of the appointment of the following commercial vice-presidents in addition to the corporate officers and directors announced in the Sept. 1 issue of "Electrical West": Eastern Region—W. J. Keenan; Central district—H. E. Thomas; Lake States district—M. A. Pixley; Pacific district—H. R. Noack.

The Pacific States Electric Company, distributor of General Electric products on the Pacific Coast, for the time being will retain its corporate existence. Effective Oct. 1, however, all business transacted by the company will be done in the name of the General Electric Supply Corporation.

The Pacific States company was incorporated under the laws of the State of California on July 6, 1909. The General Electric Company, interested from the beginning, acquired practically complete ownership of the company in 1916. The present officers of the Pacific States company, who will continue to function in an executive capacity in the newly organized Pacific district of the General Electric Supply Corporation, are: President—D. E. Harris; vice-president—H. R. Noack; vice-president and treasurer—S. B. Anderson; secretary—G. I. Kinney.

The main office of the Pacific States Electric Company is in San Francisco; branch offices are in Oakland, Sacramento, Los Angeles, Long Beach, San Diego, Phoenix, Seattle, Tacoma, Portland and Spokane.

Prices of 32-Cp. Mazda Lamps Reduced—Gerard Swope, president of the General Electric Company, Schenectady, N. Y., has announced reductions in the prices of popular types of 32-cp. Mazda lamps for automobiles, effective Sept. 1, 1929. The reductions range from 10 to 25 per cent on individual types. Mr. Swope explained that this reduction is in line with the company's policy of passing on to the consumer savings made possible through manufacturing economies in its lamp factories.

Changes Made in Sales Staff of Wesix Inc.—Wesix Inc., San Francisco, through its sales manager, C. A. Russell, has announced the promotion of C. Walton Larue, formerly sales engineer for the company in its Peninsula division, to the position of assistant sales manager of the North Wesix Electric Company, with headquarters in Portland, Ore. Mr. Russell also has announced that W. E. Bowen, formerly associated with the General Electric Company in sales and factory management and with the Pacific Gas and Electric Company and the Great Western Power Company, has joined the Wesix organization and will devote his efforts to sales and engineering work in the northern California territory.

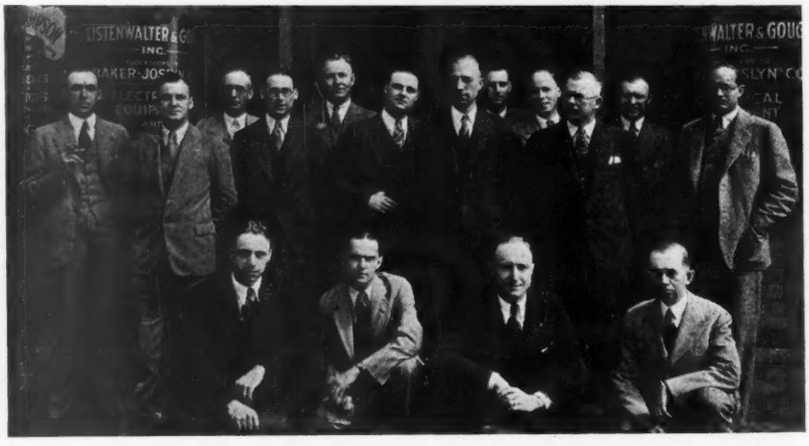
Electrical Products Corporation, Seattle, Appoints New Sales Manager—L. F. Moore has been appointed sales manager of the Electrical Products Corporation, Seattle, succeeding T. A. Mardon, resigned. Mr. Mardon, who has been associated with the corporation since its organization in 1927, has become operating manager of the Six Claude Neon sign companies now being organized in New Zealand and Australia, and his headquarters will be at Auckland, New Zealand. Mr. Moore also has been affiliated with the company since its beginning and prior to that was an electrical engineer with the Puget Sound Power & Light Company. The concern has recently moved its office, display and art departments to 1016 Virginia St., adjoining its manufacturing quarters.

New Company Formed for Wire Manufacture—The Inca Manufacturing Corporation, Fort Wayne, Ind., has recently been established for the manufacture of bare, enameled and insulated wire for use by the electrical, radio and automotive industries. George A. Jacobs, formerly president of the Dudlo Manufacturing Company of Fort Wayne and vice-president and member of the executive committee of the General Cable Corporation, is president of the Inca company. It is contemplated to establish a branch factory unit at Los Angeles at a later date.

Heating Appliance Manufacturer Appoints Western Distributor—The Utility Electric Company, St. Louis, Mo., manufacturer of electrical heat appliances, has appointed **George White,** of Los Angeles, as its representative in southern California. **Detsch & Company, Inc.,** through their offices in San Francisco, Portland, Seattle, Spokane, Salt Lake City, Denver and Phoenix, will represent the Utility Electric Company in the Intermountain territory and on the Pacific Coast, exclusive of southern California.

Electrical Washer Manufacturer Buys Building in Vancouver, B. C.—Beatty Brothers, Ltd., manufacturers of electrical washers, have purchased a three-story building in Vancouver, B. C. The building, which has track frontage, will be altered to warehouse farm equipment, pumps, churns and general hardware lines, as well as the electrical washing machines.

Making Standard Electric Stove Sales



SHORTLY after arrangements had been completed for Listenwalter & Gough to distribute Standard electric ranges in northern California, a sales meeting was held by C. C. Smoot, of the Standard Electric Stove Company, San Francisco. After the meeting the group gathered for a photograph in front of Listenwalter & Gough's San Francisco establishment.

Left to right (back row) they are: R. E. Ellis, C. Sumner, V. H. Wilson, Fred C. Wood, R. C. Duncan, J. C. Hightower, P P. Schleuse, E. J. Rising, D. G. Hopkins, C. S. Lovelace, A. W. Johnson, and W. H. Kaemper, vice-president and manager, Listenwalter & Gough; front row: C. C. Smoot, C. M. Biscoe, J. Gariepy, and A. Mcinema, sales manager.

New Office and Warehouse Occupied by Seattle Representative—Thomas S. Wood, manufacturers' representative in Seattle, has moved to a new office and warehouse at 200 Ninth Ave. The following manufactures are among those represented by Mr. Wood in the Seattle territory: American Brown Boveri Electric Corporation, Condit Electrical Manufacturing Corporation, Corning Glass Works, Bowie Switch Company and Sangamo Electric Company.

Ingersoll-Rand Company of California in New Building—The office and warehouse of the Ingersoll-Rand Company of California were moved on September 1 from former quarters in the Rialto Building, San Francisco, to a new three-story building constructed by the company at 350 Brannan St.

Allis-Chalmers Seattle Offices Moved—The offices of the Allis-Chalmers Manufacturing Company in Seattle which for many years have been at 115 Jackson St., have been moved to 1623 Smith Tower.

Across the Border

Norman Bost, of the Square D Company, Portland (*right*), after a round with J. E. Yates of the Pacific Power & Light Company at the recent Inspectors convention in Vancouver, looks happy enough to suggest that there may be something more than clubs tucked away in his golf bag.

New San Francisco Office for the Marwood Company—The Marwood Company of San Francisco moved its office and warehouse on September 1 to a building at 376 Fifth St. According to George R. Sovereign, manager, this company has recently been appointed California representative of the North Electric Manufacturing Company, Galeon, Ohio, maker of automatic telephones.

Heads Refrigeration Department of Denver G-E Distributor—The B. K. Sweeney Electrical Company, which distributes General Electric products in the Denver (Colo.) district, has appointed Jack Flynn manager of its retail refrigeration department. Mr. Flynn has been a special traveling representative for the General Electric Company's refrigeration interests for the past six years.

A Frayed Foursome

Charley Cutter, Pacific Electric Manufacturing Corporation, "Herb" Boring, General Electric Company, Charles Smutz, Graybar Electric Company, all of Seattle, and Charley Pearl, of Portland, after a hard-fought match in the recent tournament of the Seattle Electric Club at the Earlington Golf Club.

California Distributors Appointed for the Thermador—Fichling & Chaffee, 447 Sutter St., San Francisco, have been appointed California distributors of the Thermador, an electric room heater manufactured by the Hoffman Specialty Company, Waterbury, Conn.

In Charge of Sales Promotional Work For Gordon-Prentice, Inc.—Leslie T. Clawson, for seven years identified with the sales department of the Puget Sound Power & Light Company, Seattle, has been placed in charge of its sales promotional work by Gordon-Prentice, Inc., distributor of General Electric refrigerators in western Washington.

The Arrow Electric Company, Seattle, distributor for the Arrow Electric division of the Arrow-Hart & Hegeman Electric Company, Hartford, Conn., has movei its offices from 1924 Third Ave. to 1932 Ninth Ave., Seattle.

The Lincoln Electric Company and **A. H. Peir Company** have announced the removal of their Los Angeles offices to 812 Mateo St.

New Flexible Cord Standard Announced by N.E.M.A.

Announcement has been made by the flexible cord group of the National Electrical Manufacturers Association of a new standard which it is stated will greatly increase the mechanical strength and improve the serviceability of flexible cord.

The new specification, which will become effective Jan. 1, 1930, after which no cord not fully complying with it will be labeled by the Underwriters' Laboratories, reads as follows:

"All dry braids, both individual and overall, shall be braided of cotton, rayon or silk in such a manner as to result in all adjacent individual parallel threads actually touching each other, and shall show no visible open spaces, when observed through a standard braid counter."

It is also stated that cords complying with the National Electrical Code can be identified by the following points:

1. The parallel threads of all braids must touch when viewed under an ordinary single lens pocket magnifying glass.

2. The rubber covering must be tough and stretchy, similar to that on a good grade of code wire, and of the required thickness.

3. The copper conductors must either be tinned or protected by a fibrous covering to prevent corrosion.

4. The minimum copper size for a standard cord is No. 18 AWG, usually made up of sixteen strands of No. 30 AWG.

5. All Underwriters' Laboratories standard cords contain manufacturers' identifying marker threads as required by code and as given in Underwriters' list of inspected electrical appliances.

6. Underwriters' labels further identify Underwriters' Laboratories standard cords.

Seattle Distributor in New Quarters—Harrison Sales Company recently moved into a new office and warehouse at 314 Ninth Ave., North, Seattle. Among manufacturers represented in the Northwest by the Harrison company are the Edwin L. Wiegand Company, Time-O-Stat Controls Company, Janette Manufacturing Company and Harold E. Trent Company. .

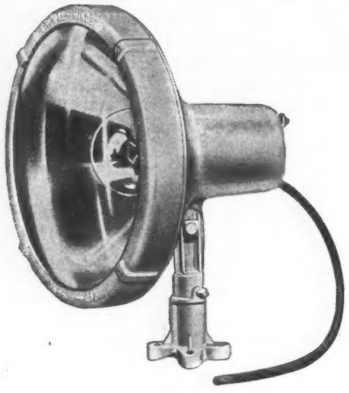
Vancouver Firm Occupies New Building—Electric Distributors, Ltd., formerly situated at 1259 Granville St., Vancouver, B. C., has moved to new quarters at 835-9 Cambie St. The firm is headed by three brothers, C., H., and S. Nemetz.

New Superintendent of G-E Oakland Works Appointed—Andrew Yatsko has been appointed general superintendent of the Oakland, Cal., works of the General Electric Company, succeeding J. R. Auguston, who has resigned.

New Equipment

Floodlight Unit

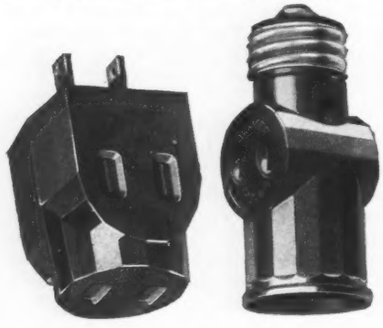
The type ADA floodlight recently announced by the **Crouse-Hinds Company,** Syracuse, N. Y., is a small compact unit adaptable to all kinds of floodlighting service. The light distribution can be varied from a narrow beam spot-



light to a wide angle short range floodlight. The unit is furnished complete, ready to install in any one of four different ways—its convenient base bolted to a horizontal surface mounted on a conduit connecting a row of floodlights, clamped to a pipe by means of U-bolts, or bolted to a vertical surface. After being mounted in any position it can be tilted at any angle desired.

Three-Way Tap and Socket

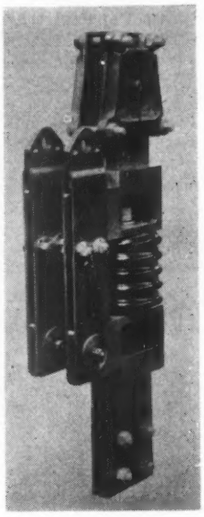
In brown Bakelite, the three-way cube tab made by the **Beaver Manufacturing Company,** 625 North Third St., Newark, N. J., is a neatly designed and at the same time a sturdy device.



The No. B-9 brown Bakelite current tap, or socket, is equipped with two pairs of slots to receive attachment plug caps and one screw shell outlet to hold a lamp. This ararngement permits the lamp to hang down straight as it should.—Electrical West, Oct. 1, 1929.

Disconnecting Switch

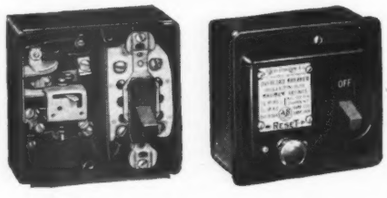
A double blade, tongue type disconnecting switch, known as the WT-14, has been developed for clamping directly on bus bars by the **Delta-Star**



Electric Company, 2400 Block, Fulton St., Chicago.

This new switch affords a convenient method of inserting a disconnect between the oil switch and bus, thus securing a high space factor and short runs to the oil switch terminal.—Electrical West, Oct. 1, 1929.

Overload Breakers for Small Motors



A complete line of overload breakers for fractional horsepower d.c. and a.c. single phase and polyphase motors is announced by the **Allen-Bradley Company,** 286 Greenfield Ave., Milwaukee, Wis.

The large number of small individually driven tools and devices used in shops, stores and homes, such as machine tools, pumps, compressors, fans, refrigerating machines, etc., has prompted the development of these breakers, which provide protection against motor burnouts and damage to the device due to overloads.

Bulletin No. 825 overload breakers have a maximum rating of 1 hp., 125 volts, and 1½ hp., 220 volts, and may be obtained with or without snap switch or fuse clips. Six forms satisfy all industrial applications.—Electrical West, Oct. 1, 1929.

Glass Top Fuses

A new line of plug fuses of 15 amp. and under with hexigon shaped heads constructed entirely of glass is being made by the **Royal Electric Company,** Chelsea, Mass. When these fuses are used the trouble-man can tell instantly, even in the dark, whether a circuit is

over or under fused. The new hexigon design permits a firm grip, allowing renewals to be made easily.—Electrical West, Oct. 1, 1929.

Caps and Receptacles

New three-wire polarized caps and receptacles have been announced by **The Bryant Electric Company,** Bridgeport, Conn. The No. 9116 receptacle at left can be used on a three-phase circuit, three-wire circuit with or without grounded neutral and also on a two-wire circuit, leaving the third pole of the receptacle available for a grounding conductor. When used on a two-wire circuit it is necessary to connect the identified terminal to some part of the grounded metal box in which it is mounted.

The No. 786 composition cap (center) is being supplied in response to an increasing demand for devices of this type in connection with the installation of electric ranges and the operation of heavy duty tools and other equipment.

The "Kenex" plug and receptacle shown at right provides a practical method for easy installation and removal of wall brackets. With this device installed fixtures can be replaced without unfastening any wires or breaking and remaking soldered joints.—Electrical West, Oct. 1, 1929.

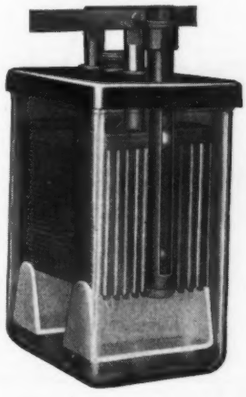
Groundometer

The Groundometer, manufactured by the **Borden Electric Company,** 480 Broad St., Newark, N. J., is a modified Wheatstone bridge designed particularly for measuring the resistance of earth electrodes. The meter is provided with automatic cutouts which function to connect the single dry cell

of the battery directly across the binding posts, preventing a burn-out in case of a short circuit through the meter. This provides a very low resistance shunt for the meter and one which has sufficient carrying capacity to operate the ordinary line fuses or circuit breaker.

The detector is a specially designed type of telephone receiver, tested for 1,000 volts breakdown, and is connected to a pair of binding posts on the face plate of the meter. When so desired for special purposes, such as routine shop testing, the detector may be replaced by a galvonometer or other visual type of balance indicator.—Electrical West, Oct. 1, 1929.

Farm Light Battery



The Farm Light Division of the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, has announced a new low price battery. An outstanding feature of this battery is the indicator-cell. With each 16-cell and 56-cell battery one cell is supplied which contains a device for indicating the state of charge of the battery.

This indicating device consists of three colored balls, red, green and white, mounted in a hard-rubber tube. During charge, the red ball will rise first, the green next and finally the white. When the white ball rises, the battery is fully charged and charging should be stopped, except in occasions where the periodic over-charge is to be given. The green ball will sink when the battery is approximately two-thirds discharged, thus giving a warning that a charging must be given. When the red ball sinks, the battery should be charged immediately.

This battery is made in two sizes, the WL-7, a seven-plate battery rated at 90 amp.-hr., and the WL-13, a thirteen-plate battery rated at 180 amp.-hr.—Electrical West, Oct. 1, 1929.

Recent Publications

Thermo-Couple Ammeters and Milli-Ammeters—A new issue of its Bulletin No. 810, covering types TW, FW and STW thermo-couple ammeters and milli-ammeters for d.c. and a.c. of all frequencies, including radio frequencies, is announced by the Roller-Smith Company, 233 Broadway, New York.

Potential Transformer Protection—S & C fuses, current-limiting resistors and combination mountings are described in Bulletin No. 200R entitled "Potential Transformer Protective Equipment" recently issued by **Schweizer & Conrad, Inc.,** 4421 Ravenswood Ave., Chicago.

"Modern Central Stations"—The fifth section in the collection of reprinted articles from various technical magazines published under this title has recently been released for distribution by the **Ingersoll-Rand Company,** 11 Broadway, New York.

A.C. Switchboard Meters—In published addenda to Bulletin No. 73 of the **Sangamo Electric Company,** Springfield, Ill., are described the narrow type HN a.c. switchboard meters manufactured by that company.

Toy Electric Trains—A 46-page, illustrated "1929 Catalog and Railroad Planning Book" is now being distributed to dealers by **The Lionel Corporation,** 15 East 26th St., New York.

Lighting Fixtures—The McPhilben Studios, 153 Jamaica Ave., Jamaica, N. Y., have published a booklet entitled "Suggestions from McPhilben Studios" which illustrates the Colonial, Early American and English hand hammered iron and brass lighting fixtures designed and manufactured at these studios. Copies of the booklet will be sent upon request of the McPhilben Studios.

Oil Burning Equipment—A new catalog recently issued by the **Combustion Engineering Corporation,** 200 Madison Ave., New York, is entitled "Quinn Oil Burning Equipment," and describes Quinn portable oil torches, oil regulating clocks, oil pressure regulating valves, steam atomizing oil burners and low pressure P-G-S burners.

Printing Press Controller—Bulletin No. 114 of the **Monitor Controller Company,** Baltimore, Md., describes an automatic, brake-stop controller designed especially for a.c. slip-ring motors of type, lithographic and gravure presses.

Upright Drills—A new catalog of Aurora drills has been issued by **The Oesterlein Machine Company,** Cincinnati, Ohio. Complete specifications of these drills in all sizes from 20-in. to 44-in. are given.

Underground Cable—"Condex Park Cable" is the title of a booklet issued recently by the **Simplex Wire & Cable Company,** Boston, describing the Condex armored cable for underground distribution.

T-Connectors—Burndy T-Connectors for high-tension bus structures are described in a pamphlet recently issued by the **Burndy Engineering Company, Inc.,** 10 East 43rd St., New York.

Westinghouse Publications — Recent publications issued by the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, include:

Circular No. D.M.F., describing Type NAB Nofuz panelboards, which operate with 15-amp. deion principle circuit breakers in place of fuses and toggle switches.

Booklet No. S.P. 1854 on "Airport Lighting."

Circular No. 1676-B, a catalog of Westinghouse "Fittings for Pipe Structures."

Circular No. 1837 on "Recent Developments in Automatic Network Protectors and Relays."

ELECTRICAL WEST Barometer of Industrial Activity in Western States

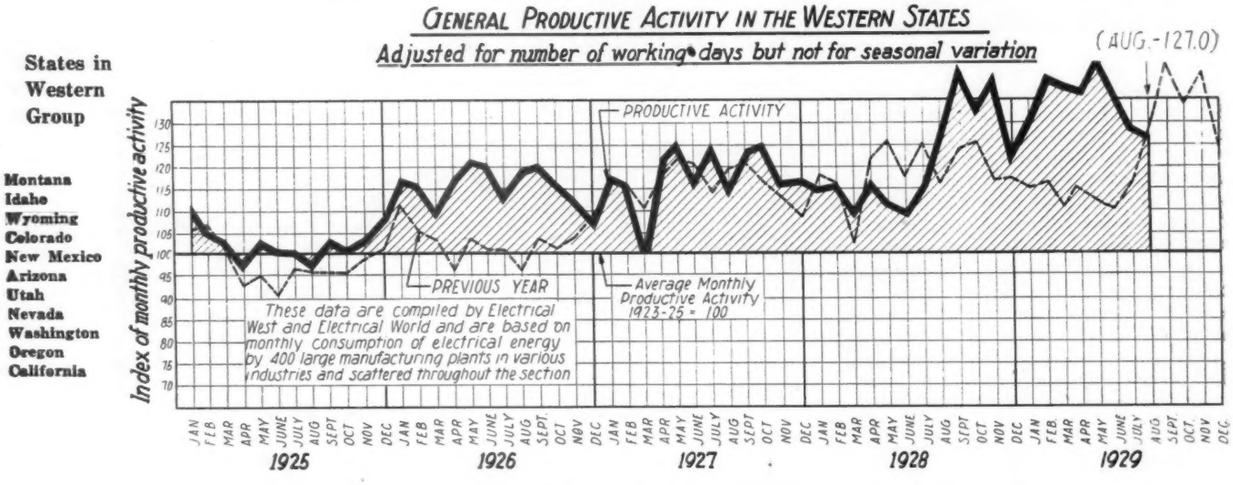
FOR the first time since July, 1928, monthly data on the consumption of electrical energy for power purposes during August indicate that the manufacturing plants as a whole in the Western states were operating at a rate under the same month in the year previous. August rate of activity was 1.9 per cent under July and 0.4 per cent under August last year. Previous years would indicate that an upward swing in rate of activity was to be expected during August as compared with July, but energy consumption figures indicate that the downward trend in manufacturing which started in June was continued through August. The August rate of general manufacturing in the Western states is the lowest recorded so far this year. During the first eight months of the current year the rate of general productive activity has averaged about 16 per cent above the same period last year.

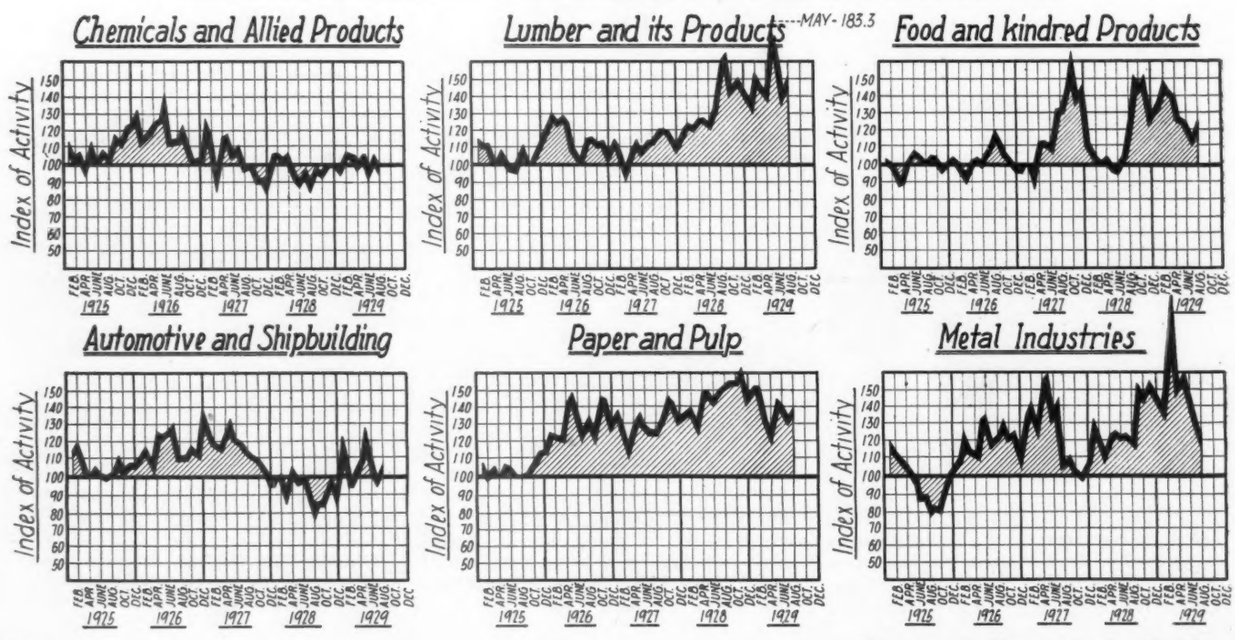
A study of the various industrial groups operating in the Western states indicates a wide variation in trend. Three of the leading industrial groups report material increases in activity over August last year, chemicals and allied products reporting a 13.4 per cent increase, metals group 5 per cent and the shipbuilding industry a 41 per cent increase over last year. On the other hand, five of the most important industrial groups of the West report an August rate of activity under that reported for August last year, the rubber products industry leading the decline with a drop in activity of 10.6 per cent followed by paper and pulp with a drop of 8.3 per cent, forest products 4.8 per cent, stone, clay and glass 4.8 per cent, and the food products industry with a drop under last year of 0.5 per cent. The paper and pulp industry has been operating under the same month in 1928 ever since last March, but this is the first time this year that the food products and forest products industries have reported a rate of productive operations under those of the same month last year.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days.)

	Aug. 1929	July 1929	Aug. 1928	Av. 1st 8 mos. 1929	Av. 1st 8 mos. 1928
All industry	127.0	129.4	127.5	135.4	116.9
Chemicals and allied products	95.7	104.4	84.4	97.7	97.2
Food and kindred products	124.5	118.8	125.1	132.6	108.1
Forest products	151.0	148.0	158.7	154.0	130.9
Metals group	123.8	135.0	118.0	152.8	122.6
Paper and pulp	139.0	134.0	151.7	141.3	143.9
Rubber products	154.0	179.7	173.2	190.9	149.8
Shipbuilding	106.4	95.0	75.6	105.9	90.9
Stone, clay and glass	123.5	149.2	129.8	139.6	145.8





Electrical West

C. T. HUTCHINSON, *Editorial Director*

With which is consolidated the Journal of Electricity
A McGraw-Hill Publication

G. C. TENNEY, *Managing Editor*

Volume 63 | San Franisco, November 1, 1929 | Number 5

More Power for San Diego

By C. W. Wiggins

Superintendent of Electric Production,
San Diego Consolidated Gas & Electric Company, San Diego

With steam-electric generating plants as the only developed source of electric energy on its system, the San Diego Consolidated Gas & Electric Company has been paying particularly close attention to the development and modernization of these facilities. The company serves San Diego and nearby territory and its system embraces almost everything from lightly loaded rural areas to congested urban sections. During the past ten years its generating capacity has been increased from about 10,000 kw. to a present total of some 78,000 kw. The recent addition of a 28,000-kw. steam unit at Station B in San Diego, together with stabilizing interchange connections to the north and east, guarantee adequate service of a highly reliable character for the southwestern corner of California.

By 1920 the demand for electric service had become so great that it was necessary to increase the generating capacity. Station A, with its rated turbine capacity of 10,000 kw., could not very well be expanded, so the company purchased the power plant of the San Diego Electric Railway Company in January, 1921. This station, located at Kettner Blvd. and E St., occupied an area of 179 ft. on Kettner Blvd. and 164 ft. on E St. and after the purchase was known as Station B.

A night view of the new Station B showing the architectural beauty of a typical modern steam plant.

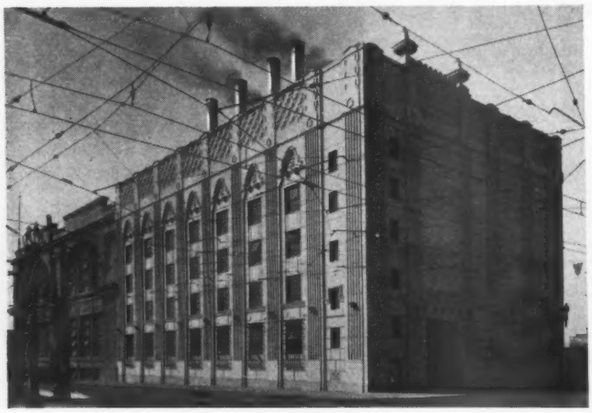
Nearly all of the equipment excepting a 6,000-kw., 2,300-volt turbine unit and four motor-generator sets for supplying power to the street railway system, was removed in remodeling the plant. By 1927 seven 1,153-hp. B.&W. cross-drum boilers and two 15,000-kw. General Electric 12,000-volt turbines had been installed in the old building and it was necessary again to expand. About that time the adjoining 121 ft. on Kettner Blvd. and 175 ft. on Broadway was purchased and plans were made for an addition to the station.

The new addition to the station which was built during 1928 is a fine example of a modern station for turbines and electrical equipment. The boiler room was not extended, but an extension will be required in the near future.

The Byllesby Engineering and Management Corporation, engineers and managers of the San Diego Consolidated Gas & Electric Company, designed the new station. It was erected by H. H. Watson, general superintendent of construction. Construction work was started in January, 1928, and the new 28,000-kw. turbine was put on the line on Nov. 15, 1928.

The new building occupies the remainder of the city block on Kettner Blvd. between the old building and Broadway. It has a frontage

of 140 ft. on Kettner Blvd. and 88 ft. on Broadway. An area at the northwest corner of the block, 87 ft. on Broadway by 121 ft. adjoining the Santa Fe Railway will be occupied later by an extension of the biulding con-



The San Diego Consolidated Gas & Electric Company's new stem-electric generating station is prominently situated and hence special attention was given to architecture.

taining electrical equipment and by an extension of the boiler room.

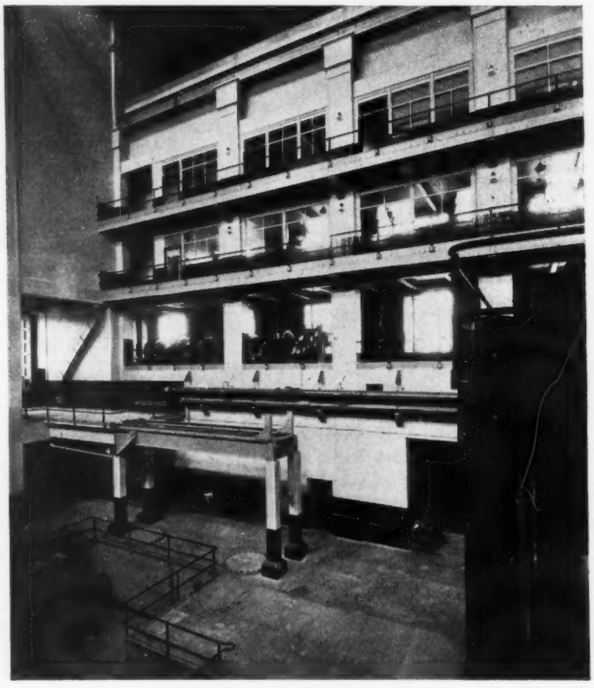
When the new building was constructed the north wall of the old building was removed, thus providing a turbine room 267 ft. 6 in. long and 56 ft. 11½ in. wide. Roof trusses are 55 ft. above the turbine room floor and 77 ft.

Circulating pump and structural steel foundation for 28,000-kw. unit.

above the basement floor of the new building. A 65-ton Shaw crane operates over the whole area of the old and new stations.

Before the building could be constructed it was necessary to build an extension of the circulating water system which supplies sea water by gravity flow from San Diego Bay. Two reinforced concrete tunnels 4 ft. x 8 ft. 6 in. supply sea water to the new turbine and provide capacity for a future one. Above these two intake tunnels are two similar discharge tunnels. The bottoms of the intake tunnels are 33 ft. below the street level and 1.6 ft. below mean low tide level. Before installing building foundations 542 25-ft. concrete piers were driven.

The new station is a "Class A" steel frame building with reinforced concrete floors and walls. The architecture is of the Spanish type to harmonize with other modern buildings in the neighborhood. Since it is prominently located on Broadway, the principal business



Partial view of turbine room showing foundation for a future unit and auxiliary equipment and office space at the side.

street of the city, near the Union railway station and steamship wharves, its appearance was considered to be of importance. It is much admired, especially at night when it is beautifully illuminated with floodlighting.

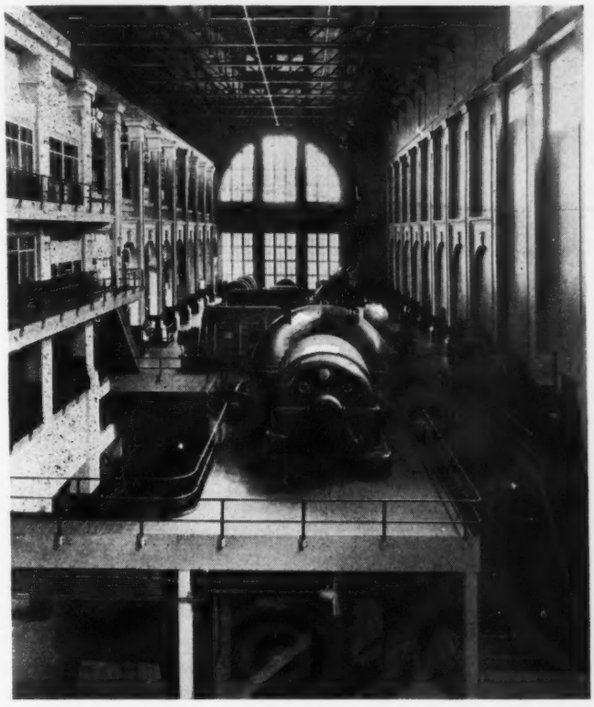
The 30 ft. on the north, fronting on Broadway, contains five floors of electrical equipment and a basement storeroom. There are also in this section stairways and halls, an automatic elevator and a large entrance and railroad track for receiving into the building cars of material which can be unloaded with the 65-ton crane. Nine-inch square red tiles are used on the five floors of the electrical galleries, on the six floors of the stair and elevator landings, and on the main turbine-room floor.

Two sets of 12,000-volt buses and duplicate oil switches are installed so that any turbine, transformer bank or feeder can be operated on either bus.

On the east or Kettner Blvd. side of the building are five floors and a basement. These floors are all 16 ft. in width and extend the full length of the new building. Stairways, halls and elevator are provided in this portion of the building. The basement contains the main

wash room, locker room, rest room and seven 2,000-kw. 2.3/12-kv. transformers. One transformer is a spare for either of the two banks. The mezzanine floor contains a conduit room next to the building wall and inside of this are an exciter switchboard, turbine-generator field rheostats, storage battery and charging set, and a switchboard for 110- and 220-volt station light and power.

The next floor is the main turbine-room floor and is called the first floor. On this floor are two 300-kw., 250-volt dual-drive exciters driven by induction motors and Terry turbines. Oil switches in steel enclosures for the control of 2,300-volt motors, transformer banks and similar equipment in the station also are placed on this floor. On the second floor are located a lavatory and a large office for the station engineer, the station electrician and the test engineer, who also is the chemist in charge of the laboratory. The south 53 ft. of this floor contains the station switchboard. On the third floor are a lavatory, three offices and a laboratory. The three offices are for the department superintendent, the assistant superintendent and the clerks. A single room 117 ft. long occupies the fourth floor, now used for plant record files. A part of it later will be used as a drafting room. The room also can be used for meetings of the employees.



Combined turbine rooms of old and new buildings as seen from an elevted position in the new portion. The 28,000-kw. unit is in the foreground.

The new 28,000-kw., nine-stage General Electric turbine-generator unit is built for 225 lb. per square inch gage pressure at 700 deg. F. Steam is bled from the third, fifth and seventh stages for feed-water heating and steam from the third stage also is used in the city steam heating system which does not operate above 20 lb. pressure.

Condensate from the hotwell pump passes through the air ejector condensers, the seventh stage and the fifth stage heaters, to the open feed-water heaters. From the open heaters the condensate and make-up water is pumped through the third stage heater to the boilers with boiler feed pumps.

With rated load on the turbine the water temperatures are as follows: Leaving the ejector condensers, 90.6 deg.; leaving the seventh stage heater, 160 deg.; leaving the fifth stage heater, 209 deg.; leaving the open heater, 212 deg.; and leaving the third stage heater, 276 deg. F.

The 12,470-volt generator is cooled by a closed system of ventilation by recirculating air through a General Electric surface type air cooler using condensate from the hotwell pump to cool the air. Provision has been made for the use of sea water in the cooler if required.

The 30,800 sq.ft. Worthington condenser is a two-pass, two-compartment unit and is so arranged that one-half of it can be taken out of service for cleaning or repairing leaks while the turbine continues in service. The 36-in. circulating pump is designed to deliver 32,000 g.p.m. against a total dynamic head of 19 ft. with an efficiency of 82 per cent. A Worthington double 30 cu.ft., two-stage air ejector is used for exhausting air from the condenser. The turbine unit itself is supported on a heavy steel structure, a type of turbine support that has been used in Byllesby plants for about sixteen years. Foundations and hotwell pit are ready for the next turbine whenever it may be required.

One of the switching galleries in the new Station B where attention was given particularly to safety, accessibility and cleanliness.

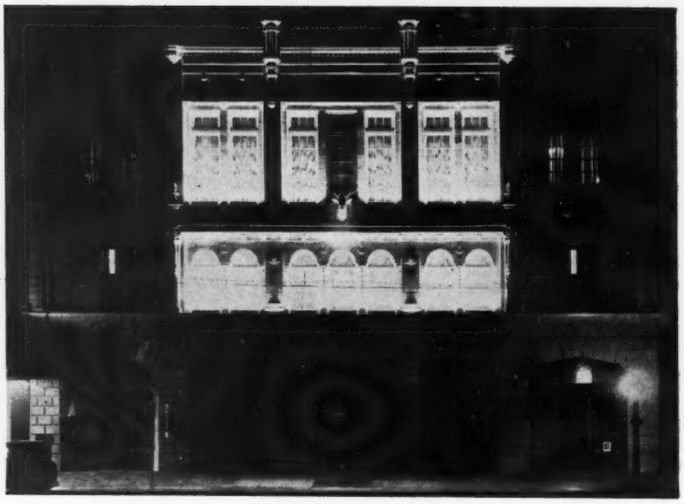
LIGHT *for* Ritual and Recreation

Fresno's New Elks' Home Is Modern in Design and in Lighting and Electrical Provisions for the Future.

By

CARL F. WOLF

Illuminating and Electrical Engineer, Valley Electrical Supply Company, Fresno.



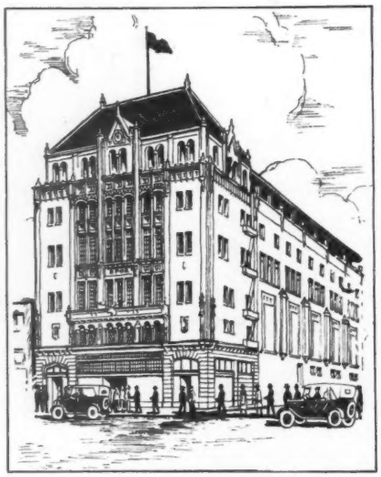
The present three stories floodlighted at night in color.

"All the World's a Stage."—*Shakespeare.*
"Let there be light."—*Moses.*

ASKED to tell how I did it, "What's your lumens per foot?" "Your voltage per foot?" was like asking an artist how many tubes each of red, blue, orange and green paint he used to create that much admired *Sunrise in the Desert*, or asking a Rodin what kind of wire and steel frame work gives form to his *Thinker*.

In my answer telling why, instead of how, there lies a story that has its beginning in the hot days of Summer, 1927, when it was much easier to daydream alongside a cascading brook in the high and cool Sierra than to think up a lighting layout "for another lodge building." But orders are orders, and when H. H. Courtright of the Valley Electrical Supply Company, of merchandising fame, loans me to an architect to counsel and help prepare electric plans and specifications, there is nothing else to do but to take off my coat and collar and go to it.

Ernest J. Kump Company, architects and engineers of Fresno, said, "We want something different, no stereotyped lodge home will do," and invited my collaboration to create something distinctive for Elkdom. How well we succeeded we leave you to judge from the pictures which speak for themselves and from the admiration expressed by Elks themselves, summed up by Murray Hulbert, grand exalted ruler and past exalted ruler of New York Lodge No. 1, when he said, without simply wishing to compliment, "You have set a building standard for Elkdom—one which I shall recommend for all future Elk temples. Your lighting equipment approximates to the fullest the spirit and order of our beautiful ritual and the purpose of our lodge."



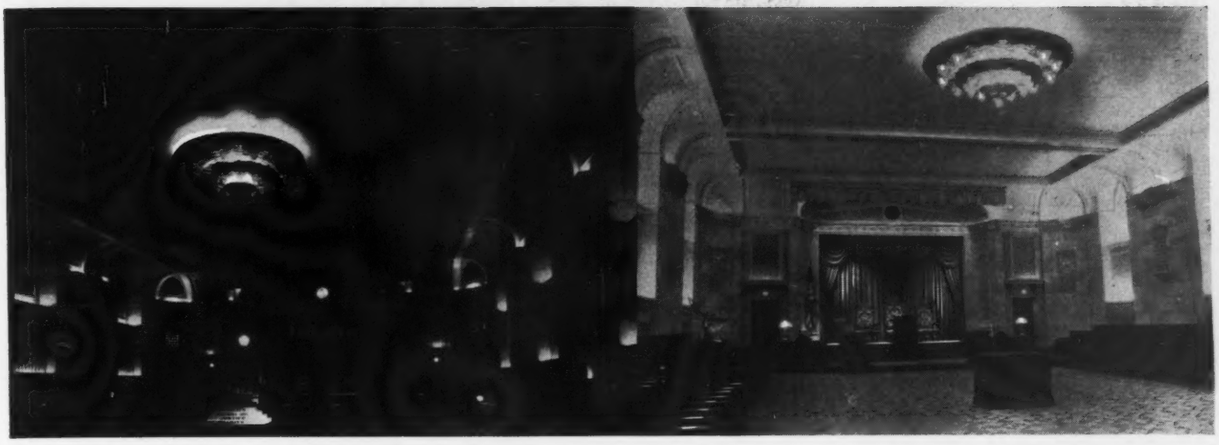
Architect's sketch of the future six-story building, three stories of which are now completed.

I said "we"—because Ernest J. Kump, his designers and I, really did work together from the very inception instead of merely "adorning" the architectural creation with a lighting and electrical layout later, as is usually the case, seldom resulting in a harmonious and working proposition.

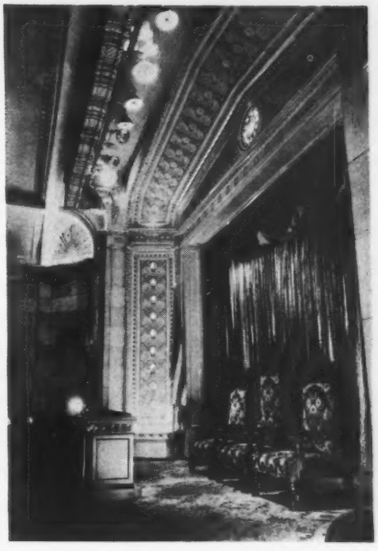
I prefaced my remarks with two quotations, very apropos when considering the creation of a lodge and club home, particularly the lodge hall around which the rest of the rooms and conveniences are built. These two quotations governed every choice of architectural form and shape, design and decoration, once the size was determined.

Why? A lodge room must first of all invite rest and complete change in thought from the day's business cares and impressions; and secondly, must be expressive of the character and work of the particular lodge or club under consideration because of the multitude of such organizations bidding for one's time and attention. And all that may be summed up in the one word, "atmosphere." Why should Elkdom not have an atmosphere, distinct and separate from that of the Masonic orders, I. O. O. F., K. of C. or other such organizations, one especially suited to its peculiar needs and purposes?

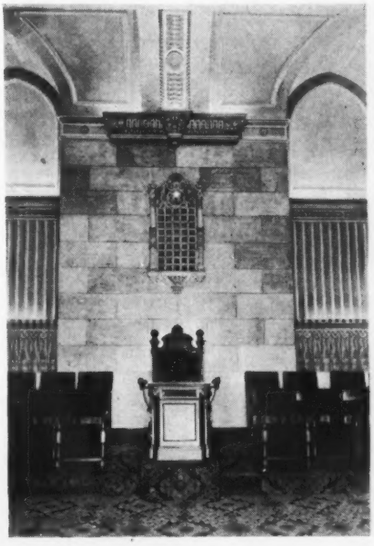
Now what constitutes atmosphere but the complete



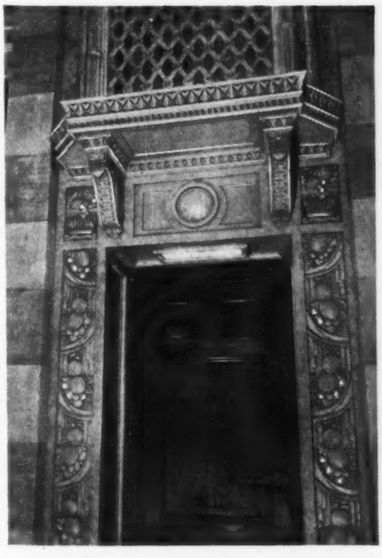
Above: The entire lodge room during ritual or (right) fully illuminated. The subdued lighting in color at the wall panels, the lighted star lowered over the altar from the ceiling motif, the spot light on the altar, the lighted clock over the stage and spots on the officers' chairs contribute to the atmosphere of the occasion. For the festive occasion all colors and white make the lodge room a gala ballroom.



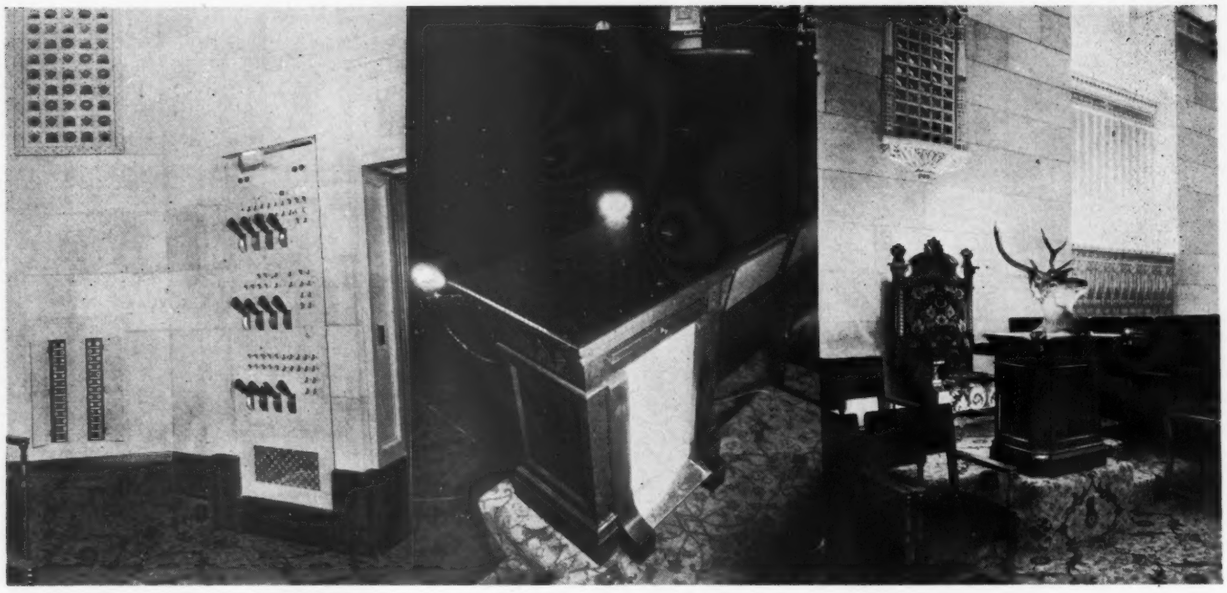
Below: A typical exit and door light installation in the lodge room, each on separate circuit control. Above the door is one of the vento grilles through which comes the light blue of outdoor sky. A key switch in this doorway gives control of the clock over the stage procenium.



Above: Forestage lighting showing spots for officers' stations, clock in procenium and lower pipe rail for mounting Shakespearian curtain for use as a stage. Hidden footlights can also be brought into play.



Center: The entire illumination is carried by means of concealed troughs of lighting units in three colors and white located in the decoration of the room. Arch-like recesses in the wall spaces furnish space for two sources of light, one playing on long flutings, the upper on a plain wall surface. In the ornaments at the tops of the colum-like spaces other lighting is placed. The grille vent provides another source of color. Finally, the stations themselves are individually lighted from within themselves. Convenience outlets at the base of the stations furnish sources for additional current if desired.



Lodge room light control and dimmer board, with forced ventilation. Fuse cabinet at lower left and one of the illuminated vento plaster grilles above.

A typical officer's station. Two small floods are mounted at corners. A reflector is mounted in the base to shine upward and a local 3-way switch gives control.

Station with Elk's head, showing illumination on head, chair and the wash of light from behind the chair which kills shadows on the back wall.

influence exerted harmoniously by architectural form and shape, detail and decoration, made manifest and blended by illumination—yes, if possible, changed by illumination to fit the particular mood of the particular exercise and time?

Form, shape, detail and decoration are fixed elements, but artificial illumination can be variable, even as solar illumination is variable, and therefore reactive upon the emotional senses of man. A wise Creator did not make light a fixed proposition, but has from the early dawn of man's existence, motivated him through the influence of light upon his emotions, from the awakening dawn, through a work-inspiring day, to the rest-inducing sunset.

Artificial illumination must approximate that influence to be effective. That very sales argument sold the architects on the relative importance of proper illumination and the electrification to bring it about.

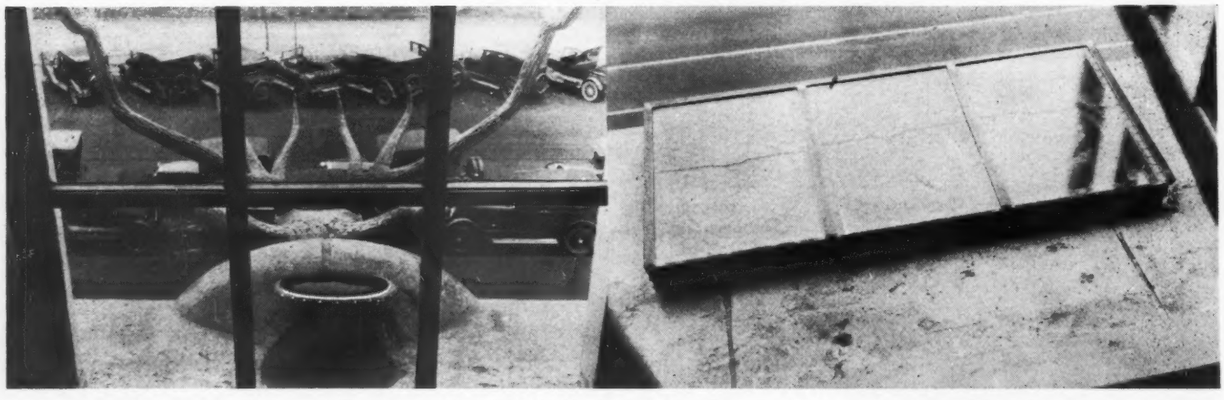
"All the world's a stage" is the only excuse for the rituals and ceremonials which differentiate lodges and clubs. It gives everyone the privilege to act and dress up at least once in a while and lifts man out of the thraldom of everyday life.

In other words a large room, besides being a meeting place, cold and formal, must have a stagey atmosphere where everyone becomes part of the play without prompting. And so we treat the whole as a stage with all the subtle influences for atmosphere that light thus exercises under the hand of an experienced electrician. (Such an "office" has been created at this lodge, choosing a member identified with the electrical industry.)

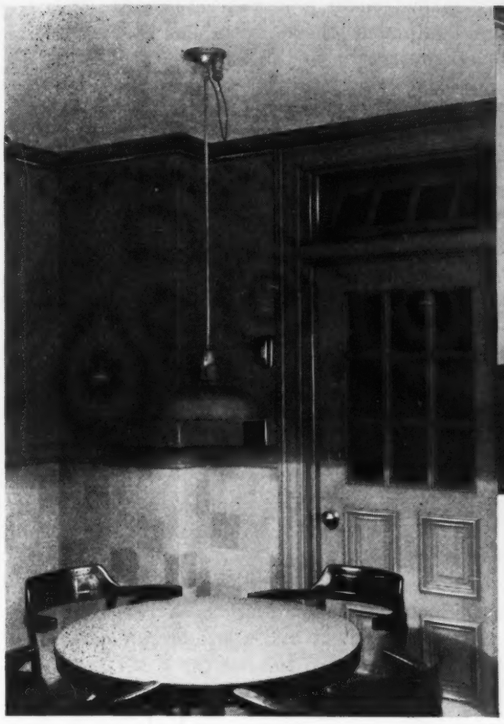
The Ritual Lighting

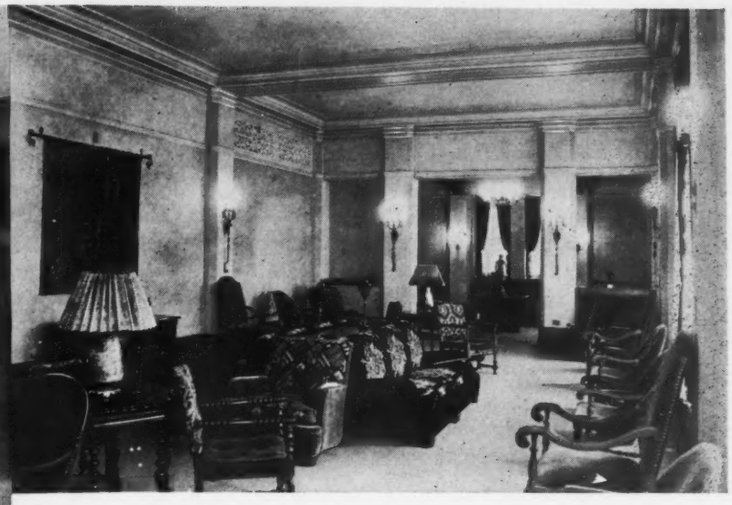
So, entering the lodge room, the inquisitive visitor finds the main control board adjacent to the Tyler's position. It is equipped with appropriate switches and dimmers and can be used to change the atmosphere of the hall to meet every spirit and mood of the ritual and the diversified uses to which the hall may be put.

Light sources that must not be confused with cove lighting are created into the very architecture of the



Left: The special flood placed to light the flag at the top of the third story. *Left*: One of the several three-reflector floodlighting units to light the spandrels.





Left: Special lighting units made of R.L.M. reflector for card room. It can be unhooked and removed when room is used for other purposes. *Above*: The main lounge. Note the outlets above the tapestries for special picture lighting. This room is abundantly supplied with convenience outlets.

room. By means of multiple color control these bathe the room in all the subtle shades of the rainbow or the season. Some of the light sources are low enough to be immediately above the heads of the audience, and thus by reason of the intensity contrast, shade the assembly almost to the point of obscuring it. This scheme is used during initiation and the opening exercises of the lodge.

The various officers' stations can be flooded individually and collectively by lights within the base of each station pedestal, augmented by miniature spots as shown in one of the illustrations. To offset any excessive and therefore grotesque shadows against the wall, the back of each officer's chair is equipped with suitable reflectors to wash out the shadows. Each officer can control his own station, or all stations may be doused by the electrician from the control panel.

Special attention has been paid to the groups of officers' chairs which are placed upon the forestage. This equipment is also illustrated. In addition to projectors trained on stations and flag, ample additional equipment is installed to augment stage borders, if the forestage is used in connection with the stage proper. For such occasions a Shakespearian curtain is suspended from the lower pipe hanger, shown under the projector supports in one photograph.

For Festive Occasions

To give the lodge room a festive atmosphere appropriate for formal dances, there are concealed sources of white light not only in the wall ornaments but also in the center ceiling decorative motif, which is equipped with 24 crystal pendants, flooded by concealed color lights, and themselves concealing 200-watt X-ray beehive reflectors.

In the center of the ceiling motif there is provided an illuminated star. Upon pressing two buttons this may be slowly and majestically lowered over the altar in the totally dark hall during the address to the "Star of Fidelity" by the officiating brother, who in turn is under a beam of light from a spot concealed within the ceiling motif.

In addition to the illumination described the decorative vento-grilles of the lodge room have concealed X-ray scoopettes lighting up the vent shafts, which are painted turquoise blue. This gives to the audience the appearance of openings into the blue evening sky, instead of the usual black spots left by such vento-grilles.

The entrances and exits not only have exit markers but door lights illuminating from concealed sources the heavily paneled doors. The organ balcony is flooded for concert work by border lights with projectors concealed in the ceiling. Convenience outlets are provided at each officer's station in the center of the lodge room and at other appropriate locations.

The stage proper is equipped with a unit type border complete with a full complement of color screens. Ample receptacles and plug outlets are provided in the baseboard of stage as well as on spot balconies, into which wing lights and spots may be plugged. Portable footlights to be set into the steps leading to the stage on each side of the exalted ruler's pedestal complete the stage equipment.

The Eleventh Hour

The clock over the proscenium arch has an illuminated face synchronized with the chimes for striking the hours. The automatic electric device for this is put into operation by a key switch adjacent to the secretary's desk.

Return call visual and buzzer signals are installed between the lodge room panel, stage panel, organ console and the fireproof moving picture booth, which is concealed behind a duplicate of the master organ screen.

The Other Club Rooms

The visitor, inspecting the club's other home appointments, will discover many well studied departures from the usual, such as the special lighting equipment of the

card rooms, officers' dining room, swimming pool, handball courts, and gymnasium.

The handball courts are lighted from floodlighing projectors installed on the spectators' balcony. To offset the excessive double shadows against walls, there are placed absolutely flush in the ceiling two units with three 200-watt reflectors behind a wire-glass cover.

Special fixtures in the card room, constructed of R.L.M. reflectors with louvre spiders, are hooked to the canopy to allow quick removal if rooms are to be used temporarily for other purposes.

All lounging rooms, the writing room, and the ladies' smoking room with its dressing room, are lighted in keeping with the period design prevailing, either by ceiling or bracket outlets, with ample convenience outlets scattered according to a somewhat permanent furnishing plan, and many additional Frank Adams fan hanger outlets for the suspension of lighting units for the illumination of pictures and tapestries.

The swimming pool is illuminated by Dolphin brackets, set within the stencil pattern on each side of the four columns and walls.

A fully equipped electro-therapeutic department adjoins the well appointed hydro-therapeutic Turkish and Russian bath department with its well illuminated and ventilated shower, dressing and locker rooms.

For the Future

The electrification of this club home as described and in many of its other appointments is up-to-date and ample for the proposed future three stories. A basement transformer vault and main switchboard of sufficient size have been provided for this later addition. A special removable slab of concrete in the passageway to the alley over the transformer vault and provision for block and tackle supports permit quick changing of transformer in case of breakdown, making it unnecessaary to transport this heavy equipment through the many and devious passages and stairways to the basement.

The high-tension oil circuit breaker in the transformer vault is remote controlled from the switchboard room through a bell crank system in a steel covered concrete trench traversing the gymnasium apparatus room that separates the transformer vault and switchboard rooms. The latter is glass enclosed to display the up-to-date safety type main switchboard.

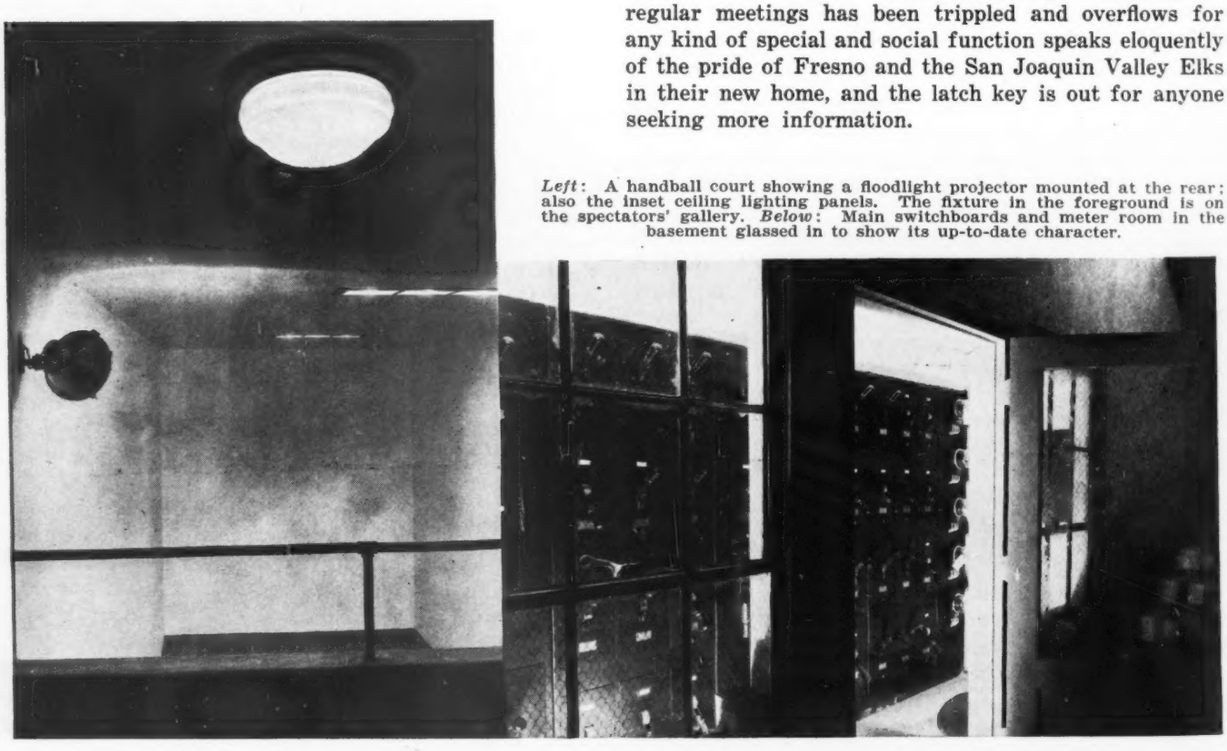
From the switchboard room a subfeeder system of adequate capacity rises to the various distributing panels and to a position on the present roof ready for future additional stories, even now designed in their major appointments. The sixth story will be a Venetian roof garden, with a glass enclosed ball room and night club, treated in ultra modern style.

Floodlighting Self-Contained

A self-contained floodlighting equipment for the entire six-story facade is provided for and executed in part on the present structure. The terra cotta spandrel of the second and third floors has installed in it suitable waterproof copper housing containing three reflectors each, with color lense equipment and a two-circuit control. A special reflector is installed to spot the Elk's head, independent of the rest of the floodlighting, even as another projector installed in the Elk's head is going to illuminate a flag whose pole will project over the sidewalk from the future fourth-floor spandrel. Only the terra cotta portion of the facade will receive floodlighting in order to accentuate only certain portions of the building.

A great portion of the electrification was incorporated in a most complete heating, cooling and ventilating system, as well as elevator and kitchen power and heat requirements.

Has it paid? Does proper illumination and electrification ever fail to pay? That the average attendance at regular meetings has been trippled and overflows for any kind of special and social function speaks eloquently of the pride of Fresno and the San Joaquin Valley Elks in their new home, and the latch key is out for anyone seeking more information.



Left: A handball court showing a floodlight projector mounted at the rear; also the inset ceiling lighting panels. The fixture in the foreground is on the spectators' gallery. *Below*: Main switchboards and meter room in the basement glassed in to show its up-to-date character.

Three-Phase Four-Wire System

Cuts Wiring Cost

in Apartment House and Hotel Range and Air Heater Installations

By C. F. Davey
Electrical Division, City of Los Angeles.

Wiring costs, it has been contended, present a hurdle over which it is hard to take the sale of ranges and air heating. If this is true, then there is hope for a drastic reduction in the height of this hurdle, particularly as applied to apartment house and hotel installations. This hope lies in a more extensive employment of the four-wire three-phase system of distribution.

All during the period preceding today's demands for electric energy a single-phase system has been sufficient for most needs, particularly in residential districts. Three-phase four-wire systems, where used at all, have been employed in loft type buildings where combined power and lighting demands have required a maximum of service from a minimum of wiring. This was especially true in old buildings requiring extensive rewiring to serve combined loads. (See Electrical West, Sept. 1, 1928, p. 152.)

But to serve the residential load the idea of three-phase four-wire distribution has been ignored or sidetracked. Perhaps this has been due to the reluctance of the utility company to extend three-phase distribution where single-phase presumably would do. With the extensive building of large apartment houses, however, using power for elevators and other mechanical equipment, it is inevitable that the three-phase distribution network must be extended.

When it is extended sufficiently to be offered to apartment house builders generally, then one obstacle to the complete electrification of such buildings will be reduced considerably.

Savings in wiring costs due to the use of the three-phase four-wire system of distribution will amount to from 33 to 45 per cent over the 110/220-volt, three-wire system. These savings will be realized in wire size and conduit requirements, switch sizes and installation labor costs. One example which will be cited herein shows the net saving of over $350 on riser pipe, wire and labor alone in a 49-range, 60-air heater installation.

The only changes necessary to make possible the use of this system in the range itself are a rearrangement of connections of the elements and load balancing switching. California State Safety Orders would also tend to require certain safe-guards as to closed tops or otherwise protected range elements.

It will be well to consider some of the elements and consequences of such a system.

The metering depends on a special 220-volt, three-phase, horizontal-type meter. An additional coil is required in it to register the unbalance on the 110/220-volt load. Yet since large apartment loads usually require current coils, the cost of this special meter is of minor importance to the utility serving the load.

Accompanying this article is presented an economy study in transformer costs made by one of the utilities in Los Angeles. It was desired to know what effect it would have on the equipment required of the utility. This study tends to show a material saving effected for the utility by this type of installation. This study (table A) is based on the assumption that there would be some three-phase motor load in the building.

On a range manufacturer falls a small additional cost. This additional cost consists of the installation of a five-wire bus within the range. Where the ranges would all be used on a four-wire system this should not be serious as the complete order of ranges for an apartment house could be wired by the manufacturer to conform with the diagram shown in Fig. 1. This is a four-wire bus diagram and would be all that would be required of a range which was to be used for this type of installation only.

TABLE A

Economy Study of Transformer Installation Costs to Serve Apartment House Load

Made by A. L. Williams, Bureau of Power and Light, Los Angeles

SUMMARY

Apt. House†	Connected Load				Annual Cost*	
	Light	Range	Heat	Power	Single-phase	Three-phase
A	35 kw.	84 kw.	0	10½ hp.	$74.10	$73.62
A_1	35 kw.	84 kw.	24 kw.	10½ hp.	83.02	73.62
A_2	35 kw.	84 kw.	96 kw.	10½ hp.	99.55	105.35
B	120 kw.	360 kw.	0	20 hp.	166.28	159.09
B_1	120 kw.	360 kw.	60 kw.	20 hp.	166.28	159.09
B_2	120 kw.	360 kw.	240 kw.	20 hp.	196.08	186.26

† Representing six different loadings, three each on two different apartment houses.
* Representing transformer installation costs based on 8¼ per cent of total as annual cost, also core losses at $0.01 per kw.-hr.

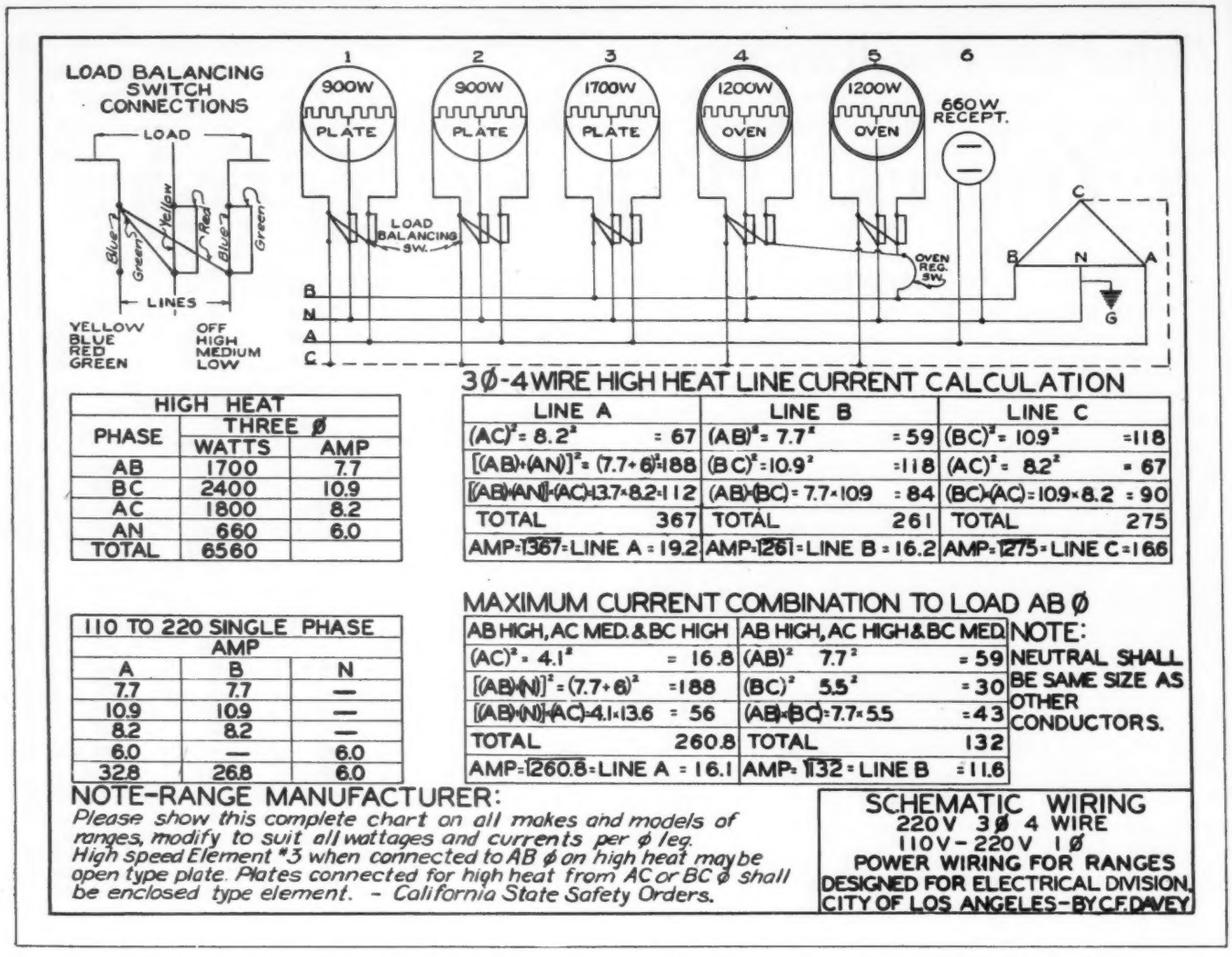

LOAD BALANCING SWITCH CONNECTIONS
LOAD
LINES
Blue
Green
Yellow
Red
Blue
Green
YELLOW OFF
BLUE HIGH
RED MEDIUM
GREEN LOW
1 900W PLATE
2 900W PLATE
3 1700W PLATE
4 1200W OVEN
5 1200W OVEN
6 660W RECEPT.
LOAD BALANCING SW.
OVEN REG. SW.
B
N
A
C
G
3Ø-4 WIRE HIGH HEAT LINE CURRENT CALCULATION
LINE A
(AC)² = 8.2² = 67
[(AB)+(AN)]² = (7.7+6)² = 188
[(AB)+(AN)]-(AC) = 13.7-8.2 = 112
TOTAL 367
AMP = 1367 = LINE A = 19.2
LINE B
(AB)² = 7.7² = 59
(BC)² = 10.9² = 118
(AB)-(BC) = 7.7-10.9 = 84
TOTAL 261
AMP = 1261 = LINE B = 16.2
LINE C
(BC)² = 10.9² = 118
(AC)² = 8.2² = 67
(BC)-(AC) = 10.9-8.2 = 90
TOTAL 275
AMP = 1275 = LINE C = 16.6
HIGH HEAT
PHASE | THREE Ø WATTS | AMP
AB 1700 7.7
BC 2400 10.9
AC 1800 8.2
AN 660 6.0
TOTAL 6560
110 TO 220 SINGLE PHASE AMP
A B N
7.7 7.7 —
10.9 10.9 —
8.2 8.2 —
6.0 — 6.0
32.8 26.8 6.0
MAXIMUM CURRENT COMBINATION TO LOAD AB Ø
AB HIGH, AC MED. & BC HIGH
(AC)² = 4.1² = 16.8
[(AB)-(N)]² = (7.7+6)² = 188
[(AB)-(N)]-(AC) = 4.1-13.6 = 56
TOTAL 260.8
AMP = 1260.8 = LINE A = 16.1
AB HIGH, AC HIGH & BC MED.
(AB)² 7.7² = 59
(BC)² 5.5² = 30
(AB)-(BC) = 7.7-5.5 = 43
TOTAL 132
AMP = 1132 = LINE B = 11.6
NOTE: NEUTRAL SHALL BE SAME SIZE AS OTHER CONDUCTORS.
NOTE-RANGE MANUFACTURER:
Please show this complete chart on all makes and models of ranges, modify to suit all wattages and currents per ø leg. High speed Element #3 when connected to AB ø on high heat maybe open type plate. Plates connected for high heat from AC or BC ø shall be enclosed type element. - California State Safety Orders.
SCHEMATIC WIRING
220V 3Ø 4 WIRE
110V-220V 1Ø
POWER WIRING FOR RANGES
DESIGNED FOR ELECTRICAL DIVISION,
CITY OF LOS ANGELES-BY C.F. DAVEY

Fig. 1. Wiring diagram for range and switches for use on 3-phase 4-wire system; also current demand tables.

If the manufacturer wished to make the range wiring universal so that the range might be adapted either to the three-phase four-wire system or to the ordinary single-phase system, it would be wired according to the diagram shown in Fig. 2. In this it will be seen that by installing a fifth bus and picking up one-half the load connected to C phase by means of two links as shown, a tie could be made between one C bus to phase B and one C bus to phase A. This would make it a 110/220-volt range as wired at present.

Any additional costs of such wiring would be compensated for by the omission of fuses to each element. These fuses could be omitted based on the 300-per-cent carrying capacity called for by the California State Safety Orders. The ranges, according to the Safety Orders, should be equipped with an enclosed-type element. The oven elements, however, could be open-type units when guarded by a baffle. Likewise the high-speed unit when connected to AB phase would be an open-type unit.

There is much to be said for the enclosed type of element from a sanitary standpoint. Most manufacturers give an optional choice of open- or closed-type elements at no additional cost. Moreover, the new high-speed elements being brought out are nearly all of an enclosed or at least protected type.

From the electrical contractor's standpoint this system is interesting in many ways. In the first place it permits material reduction in wire, conduit and switch sizes.

It is obvious that wire sizes can be reduced because of the difference in characteristics of the three-phase as against the single-phase 110/220-volt system. Fig. 1, in which are analyzed the loadings on each wire, illustrates this point to best advantage. It will be seen in the diagram that for the 110/220-volt single-phase system the current carrying capacity required is that to handle 32.8 amp. This calls for No. 8 wire. On the three-phase four-wire system, however, the maximum line current is 19.2 amp., requiring four No. 12 wires.

Obviously, range elements while operating on high heat require the largest size wire. Therefore, the entire system may be regarded as a three-phase system, plus

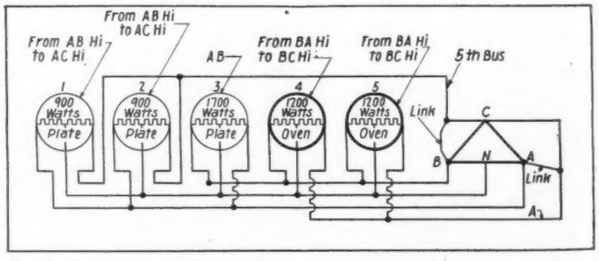


Fig. 2. Diagram showing connections by means of links and fifth bus by which range might be cut over from 3-phase 4-wire to single-phase 3-wire operation.

one additional wire for a neutral, the size of which may be 50 per cent of the largest wire for feeders and sub-feeders with 100 per cent neutral for circuits. Tests in the near future will determine whether or not this 50 per cent is correct, but theoretically it should prove the case.

In actual installations when connected 110-220 volt single phase, it has been found that the actual connected wattage per phase leg has a tendency to unbalance the feeder supplying a group of ranges, whereas in the three phase four wire each range affords as near an ideal balance as can be expected with the present wattage including all ovens and plates.

The utility operating this system has as near a perfect balance as can be expected with the present wattages per unit as ranges are now manufactured. These wattages could eventually be modified slightly to give better balance and deliver the maximum B.t.u. to the consumer for the wire required. This is true, however, not only on a three-phase, but on the single-phase operation also. If manufacturers are considering any changes in design of ranges now or in the future the contractor, the utility and the owner could profit to a large degree if range sizes were determined by the carrying capacity of wires, rather than arbitrarily, as seems to be the case at present. Thus a range of 25-amp. capacity could be fed by No. 10 wire and full advantage be taken of the B.t.u. output with no excess in the number of circular mils required.

Air Heaters

With the four-wire system the built-in type of air space-heater can be used in combinations not obtainable in straight three-phase heating. It permits two 110-volt elements to be grouped in series on high heat on 220 volts connected to A and C phase, A and B phase, or C and B phase, or on medium and low heats as required by using the neutral and A phase or the neutral and B phase (C phase being designated as the power leg or 187 volts to ground).

Under this system it is possible also to connect a pilot or bullseye on the outside or over the door of an apartment, at the apartment house entrance or near the control switch, permitting the use of a standard small-base receptacle and 110-volt lamp, this bullseye being connected to A phase N or B phase N at any heater. This is possible because phase A or B appears at any heater if connected to a single-phase 220-volt supply of a three-phase four-wire system.

In so called single or bachelor apartments another form of bullseye or pilot installation is that of installing a master pilotboard in the manager's office. This would indicate which heaters were on in any part of the building. In this particular case a simple wiring method can be employed because in an apartment of this size as a rule not over two air space-heaters are required and both may be on one phase of the 220-volt, three-phase, four-wire system, permitting one return for two heaters to one bullseye pilot on the master pilotboard.

Such a system of pilot lighting can be used to check when tenants leave whether or not the heaters have been left on.

Further simplification would be possible for ranges and space-heaters if a color code of wiring were used There is a general tendency to require some color other than black for the other ungrounded conductor in a three-wire 110/220-volt lighting circuit. In the three-phase, four-wire system, it has been required to use a red wire or one painted red at terminals, as the C phase (187 volts to ground) or power leg of the system, and a white neutral, one black wire and one of some other color such as green or blue for the 150-volt-to-ground legs. These multi-color code wires are now obtainable.

At the present time where an ordinary single-phase 220-volt system fed from a three-phase riser is in use it is possible and it often happens that a number of ranges are placed on a single side of the riser circuit and very often all of these are thrown on at the same time, causing a serious unbalance to the line. This may occur on a single-phase 220-volt riser connected to three phase.

But on the four-wire three-phase system each range balances its own load by virtue of the internal wiring of the range itself, which maintains as near a perfect balance as can be obtained at all times. The Fig. 1 diagram indicates this clearly. At the most the total unbalance would not exceed 3 amp. on the high heat, which could be compensated for by the transposition of A and B phase on the range on the next floor or in the next apartment. Where this is done it will be possible also to balance the maximum current combination to load A and B phases.

Another refinement for better load balance would be the use of a switch with a neutral terminal block located between A and B phases. The ordinary three-blade switch should be labeled or colored to identify the C, B, and A phases, respectively.

Although the utilities are not yet ready to commit themselves on the matter of this type of servicing, both utilities in Los Angeles at present have agreed to serve apartments and hotels with this four-wire system and metering arrangement when the following conditions obtain:

1. When a master meter only is to be installed and when some three-phase load is required in the building, such as for elevators, pumps, refrigeration, etc.

2. When there are at least eight ranges and 3 hp. of three-phase, 220-volt motor load and/or a connected load of 200 amp., three-phase, 220 volt. (This loading will require current transformers to accommodate this metering arrangement.)

Wiring Cost Analysis on Risers and Feeders

In a recent installation in a large aparament house where 49 electric ranges and 60 air heaters were installed the following comparison of costs was made:

Requirements

40 ranges of	4,700	watts each
8 ranges of	5,360	watts each
1 range of	8,460	watts
49 ranges of	239,340	watts total.

60 heaters of 1,000 watts each (220-volt, single-phase)—a total of 60,000 watts.

Total wattage, ranges and air heaters	299,340	watts
at 50 per cent demand	.05	
Total demand	149,670	watts

On the 3-Phase 4-Wire System

$$\frac{149{,}670 \text{ watts}}{220 \text{ volts}} = 680 \text{ amp.} \qquad \frac{680 \text{ amp.}}{1.73} = 393 \text{ amp.}$$

393 amp. calls for 3 500,000-circ.mil wires or a total of 1,500,000 circ.mils, giving a wire area of	3.00
Neutral of one No. 2/0 wire of 133,100 circ.mils wire area	.36
Required conduit size	3 in.

On the Single-Phase 110/220-Volt System

$$\frac{149{,}670 \text{ watts}}{220 \text{ volts}} = 680 \text{ amp. calls for wire of}$$

1,100,000 circ.mils × 3 = 3,300,000 circ.mils. Wire area 6.12
Required conduit size ..... 4 in.
(3,300,000 circ.mils — 1,633,100 circ.mils = 1,666,900 circ.-mils saved.)

Conduit Savings

3-in. conduit—$ 67.50 per 100 ft., or $ .67 per ft.
4-in. conduit—$108.00 per 100 ft., or $1.08 per ft.

Saved per ft. ..... $ .41
Total saving this job on risers alone, $52.20.

Wire Savings

Single-phase system: 420 ft. of 1,000,000-circ.mil*	$495.69
Three-phase 4-wire: 420 ft. of 500,000-circ.mil	207.14
140 ft. of No. 2/0	23.35
Total	$230.49
Total saving on feeders alone	$265.20

* Data on 1,100,000-circ.mil wire as required not available as it must be made up on order. Therefore figures of 1,000,000-circ.mil were used for the purposes of this calculation.

Labor Saved

Using the Electragist system of unit labor cost data, the cost of installation of riser conduit and for pulling feeders on

single-phase system is	$158.00
Three-phase 4-wire system is	108.00
Net saving on labor	$ 50.00

Total Saving on Risers

On conduit of smaller size	$ 52.20
On smaller wire sizes	265.20
On installing labor	50.00
Total saved	$367.40

SAVINGS IN WIRING

So much for the theory of this type of servicing. An actual example of the saving in wiring costs is presented in the following table.

The total net saving on risers and feeders alone, therefore would be $265.20 on wire, $52.20 on conduit and $50 on labor, a total of $367.40. No consideration has been given in the foregoing table to the savings possible on switches, either for the circuits or for main-line switching. Likewise circuit wiring aind conduit savings would be considerable. For instance, four No. 14 wires could be pulled instead of three No. 10's and the conduit size could be ½-in. as against ¾-in. throughout the building.

Where cost of wiring is set up as an obstacle to the installation of electric ranges and air heaters in competition with gas equipment, such a reduction in the wiring costs cannot help but prove a boon to the salesmen for the electrical idea. Such savings are actually being made in recent apartment installations in Los Angeles where the idea is being given a thorough test.

Relative Advantages of Curtained and Curtainless Electric Brooders

By J. E. DOUGHERTY

Associate Professor of Poultry Husbandry, College of Agriculture, University of California, Davis.

ELECTRICITY as a source of heat for brooding chicks has proved extremely popular with poultry keepers in California because of its convenience. Electric heating differs from other methods in two very important ways, first, the air is not vitiated by the combustion of fuel, and second, the heat can be turned off and on as frequently as is necessary to maintain any given temperature.

Since electric heating does not consume oxygen from the air but leaves it all for the chicks, one might suppose that its use for brooding would simplify the problem of obtaining adequate ventilation, and it should do so if properly applied. But in learning to use electric brooders poultrymen generally have tried to hold down the consumption of electric energy by restricting ventilation. This practice is frequently carried to the point where the flow of air through the brooder is insufficient to remove the moisture produced by the chicks rapidly enough to prevent condensation.

The air breathed in by each chick is warmed and brought into intimate contact with the moist mucous lining of the air passages while oxygen is being taken from it. Hence, when exhaled, it not only contains carbon dioxide but is heavily charged with water vapor. As ventilation of the brooder is curtailed this water vapor, together with the moisture excreted in the feces, apparently causes the humidity to rise toward the dew-point more rapidly than the oxygen content falls toward the danger point. Unless there is sufficient ventilation to remove this moisture the air of the brooder soon becomes saturated. Currents of saturated warm air circulating from the center of the hover downward and outward become cooled and can hold less water vapor. The surplus is deposited on the cooler surfaces near the floor. When this occurs the brooder is said to "sweat." The relative humidity, therefore, rather than content of either oxygen or carbon dioxide, would appear to be the real indicator of effective ventilation of an electric brooder.

The quantity of water vapor that air will hold is doubled with each 27 to 30 deg. F. rise in temperature and is halved with each 27 to 30 deg. F. fall in temperature. This fact has a very important bearing on the ventilation of an electric brooder in controlling ventilation and promoting dryness. For example, every cubic foot of air at a room temperature of 60 deg. F. which enters an electric brooder with an automatically maintained temperature of 90 deg. F. can absorb at least

as much more moisture at the hover temperature as it contained before it entered. If, as would usually be the case, the relative humidity of this air when it enters the brooder is considerably below 100 per cent, it can absorb even more than twice what it held before entering. Therefore every cubic foot of air entering the hover should absorb a certain amount of the moisture being produced by the chicks and every cubic foot of air leaving the hover should carry away a greater amount of moisture than it brought in. Increasing the number of cubic feet of air moving through the brooder per minute should speed up the removal of moisture, whereas decreasing the air movement should slow it down. The rate of movement of the air through an electric brooder evidently influences the removal of moisture and the degree of dryness that is maintained under the hover.

The chief motive force in natural ventilation is heat. Heat produces temperature differences in air that set it in more or less rapid motion depending upon the range of temperature involved. Brooders use the natural system of ventilation. The inflow of fresh air and outflow of stale air are brought about by differences in temperature between the air in the brooder and that in the brooder room. The rate of air flow, however, depends not only on such temperature differences but also on the size and location of the ventilation openings.

When warmed air leaves the hover, the electric heating elements must warm the fresh air that enters to replace it and the more rapid this circulation of air through the brooder, the more rapidly is heat absorbed and removed. Electricity to produce heat costs the poultryman money. It is not free like air. Hence a flow of air through an electric brooder which, due to too large openings for ventilation, is in excess of what is needed to remove the moisture produced by the chicks and keep the hover dry, causes a needless waste of electric energy.

In a consideration of curtainless brooders which, as a rule, use radiant heat, and curtained brooders using black heat, a number of important problems are involved. These are (1) the effect of radiant heat on the comfort of the chicks as compared with black heat, (2) ventilation control, (3) heating capacity, and (4) cost of operation.

The radiant heat produced by glowing elements is not necessarily superior to the non-radiant heat from heating elements that do not glow in keeping an electric brooder dry. Neither are red hot stoves more desirable than a hot air furnace in heating a dwelling. Radiant heating units, unless properly designed and installed, may cause the center of the hover to become so hot that the chicks cannot remain there. Such a condition not only reduces the warm area under the brooder that the chicks can safely use but may cause injurious crowding.

As previously pointed out, the air flowing through an electric brooder not only removes moisture but also carries away heat. Further, the amount of air moving in and out per minute depends both on differences in temperature between the air inside and outside of the brooder and on the size and location of the ventilation openings. Therefore the air flow through a brooder set at 90 deg. F. should be greater at a room temperature of 50 deg. F. than it would be at a room temperature of 80 deg. F., if the ventilation openings remain the same. It should likewise be increased by enlarging the ventilation openings without any change in room temperature.

Electric brooders must be operated under a wide range of conditions including cold as well as warm weather and wet as well as dry weather. Therefore it would seem, from what has been said, that an effective method of controlling ventilation is desirable. For this purpose the curtain used on brooders of the black heat type offers a simple and very practical means of regulating the size of opening through which air can pass in and out by changing the height of the curtain above the floor. It is true that the curtain does away with that characteristic of "foolproofness" of ventilation possessed by the curtainless brooder. The curtain must be raised or lowered to meet weather conditions and the age of the chicks. But it does offer a very inexpensive and effective way of regulating ventilation to keep the hover dry without excessive waste of heat.

Sufficient heating capacity to keep day-old chicks comfortable in the coldest weather that may occur while brooding is a third requirement of an electric brooder. If air flows through the brooder too rapidly, it may remove heat faster than the electric heating units can generate it and the desired temperature under the hover cannot be maintained. If the heating units are large enough to prevent a fall in temperature, but the rate of flow of air (which tends to increase as the room temperature drops more and more below that of the brooder), is greatly in excess of what is required to keep the brooder dry, an excessive amount of electric energy must be consumed.

A curtainless brooder is most apt to suffer from overventilation and undue heat loss in cold weather because of the large amount of ventilation opening provided even when this is reduced as much as possible. Two and one-half to three inches from the floor is as low as the edge of the curtainless brooder can be placed, whereas a curtain can be lowered close to the floor without interfering with the movement of the chicks in and out.

From the standpoint of operating cost the curtainless brooder provides abundant ventilation without the necessity of much, if any, manual adjustment up and down from time to time. The curtained brooder, on the other hand, will permit equally as good ventilation as the curtainless type if the bottom of the curtain is kept high enough. It can also be lowered to further restrict air circulation through the brooder in cool weather and thus conserve electric energy without impairing effective ventilation. The greater flexibility of control provided by the curtain enables the poultry keeper to adjust ventilation better to prevent a waste of heat and to reduce the consumption of electricity during the colder part of the brooding season when the lack of a curtain might permit more of a circulation of air through the brooder than required.

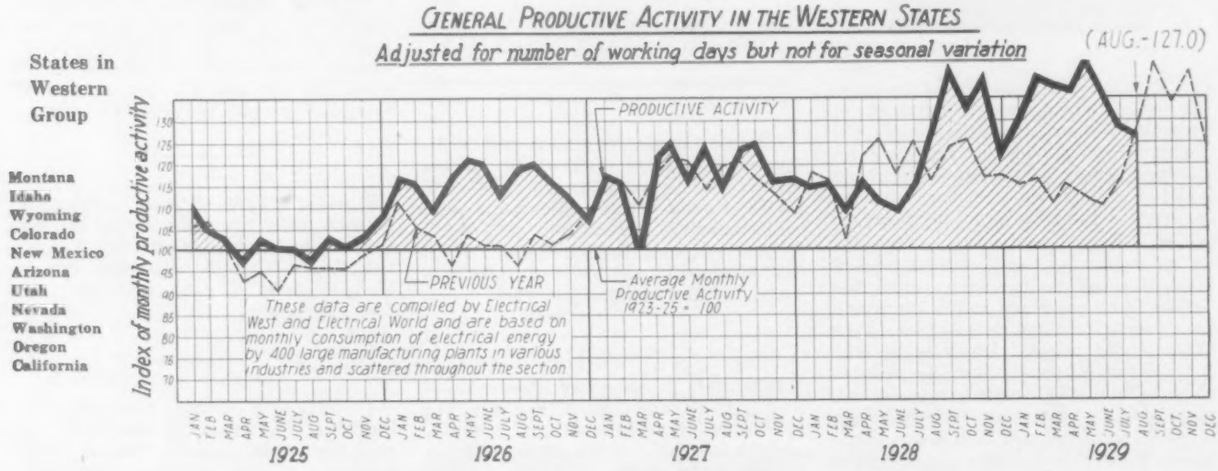
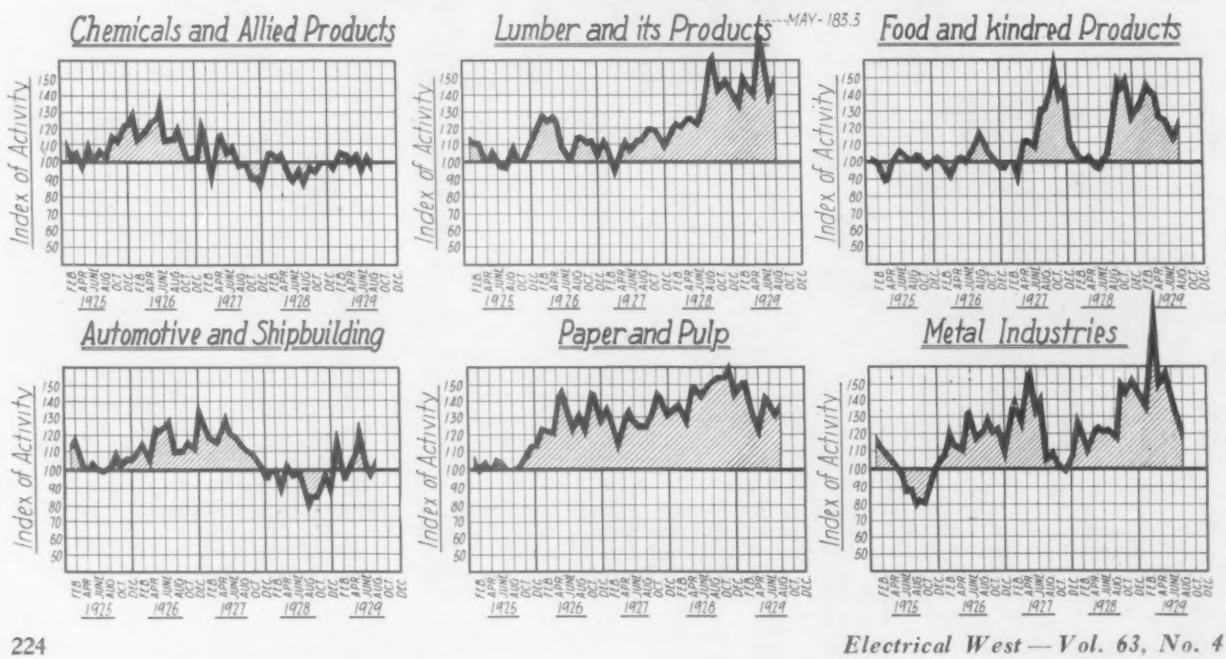
Well designed brooders of either type should give equally good results, in so far as quality of chicks reared is concerned. On this basis the problem presented by the use or non-use of a curtain is more economic than biologic. It involves cost of rearing rather than vigor of growth. A flexible control of ventilation demanding intelligent operation to obtain results is compared to a fixed minimum ventilation that guards the chicks against mistakes of the inexperienced operator but may increase fuel costs.

Electrical West Barometer of Industrial Activity in Western States

FOR the first time since July, 1928, monthly data on the consumption of electrical energy for power purposes during August indicate that the manufacturing plants as a whole in the Western states were operating at a rate under the same month in the year previous. August rate of activity was 1.9 per cent under July and 0.4 per cent under August last year. Previous years would indicate that an upward swing in rate of activity was to be expected during August as compared with July, but energy consumption figures indicate that the downward trend in manufacturing which started in June was continued through August. The August rate of general manufacturing in the Western states is the lowest recorded so far this year. During the first eight months of the current year the rate of general productive activity has averaged about 16 per cent above the same period last year.

A study of the various industrial groups operating in the Western states indicates a wide variation in trend. Three of the leading industrial groups report material increases in activity over August last year, chemicals and allied products reporting a 13.4 per cent increase, metals group 5 per cent and the shipbuilding industry a 41 per cent increase over last year. On the other hand, five of the most important industrial groups of the West report an August rate of activity under that reported for August last year, the rubber products industry leading the decline with a drop in activity of 10.6 per cent followed by paper and pulp with a drop of 8.3 per cent, forest products 4.8 per cent, stone, clay and glass 4.8 per cent, and the food products industry with a drop under last year of 0.5 per cent. The paper and pulp industry has been operating under the same month in 1928 ever since last March, but this is the first time this year that the food products and forest products industries have reported a rate of productive operations under those of the same month last year.

Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days.)

	Aug. 1929	July 1929	Aug. 1928	Av. 1st 8 mos. 1929	Av. 1st 8 mos. 1928
All industry	127.0	129.4	127.5	135.4	116.9
Chemicals and allied products	95.7	104.4	84.4	97.7	97.2
Food and kindred products	124.5	118.8	125.1	132.6	108.1
Forest products	151.0	148.0	158.7	154.0	130.9
Metals group	123.8	135.0	118.0	152.8	122.6
Paper and pulp	139.0	134.0	151.7	141.3	143.9
Rubber products	154.0	179.7	173.2	190.9	149.8
Shipbuilding	106.4	95.0	75.6	105.9	90.9
Stone, clay and glass	123.5	149.2	129.8	139.6	145.8